MANITOBA
INSTITUTE OF TECHNOLOGY

TECHNOLOGY DIVISION

2055 NOTRE DAME AVENUE
WINNIPEG 23, MANITOBA

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DEPARTMENT OF EDUCATION
PROVINCE OF MANITOBA

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Administered by
PROVINCIAL VOCATIONAL SCHOOLS DIVISION
Manitoba Department of Education
with financial assistance provided by
the Federal Government

* 

Hon. George Johnson, M.D. . . . . . . . . Minister of Education
E. B. Angood, B.Sc., (Eng. Sc.) . . . . . . . . Director,
Provincial Vocational Schools Division

Approved by and issued under the authority of the Minister of Education.
The Honourable George Johnson, M.D.
Minister of Education
Foreword

We are living in a rapidly changing world. Technological advances are taking place in every sector of the world’s economy: in Agriculture, in Forestry, in Electricity, in Mining and in many other areas. We in the Province of Manitoba are caught up in and share this feeling of change and excitement.

As science advances, new occupations are created and others become obsolete. Vocational education is no longer limited to the training of the unskilled worker but has assumed the broader role of re-training and upgrading the semi-skilled and skilled worker. In order to keep pace with the growth in our economy, vocational education facilities have been and will continue to be expanded. The opening of new Centres at The Pas and Brandon, the expansion of the Manitoba Institute of Technology in Winnipeg and the ongoing plans for the new Manitoba Institute of Applied Arts, are in keeping with our Province’s growing and changing economy. These centres will provide a wide variety of courses to assist in meeting our requirements for skilled tradesmen, technicians, and business people in many fields.

Courses must be kept up-to-date and new courses must be introduced as our economy dictates. These needs are assembled through Advisory Committees made up of representatives from business, industry and labour. These committees also provide guidance in assisting young adults to make a wise choice of a career. They make known the employment opportunities of their industry and in many cases provide scholarships and bursaries for deserving students.

We are witnessing strong co-operation between the different sectors of our economy and between the different divisions of government in the development of programs to train and retrain the people required in our rapidly expanding economy.

Honourable George Johnson, M.D.
Superintendent's Message

The Manitoba Institute of Technology is basically four schools in one.

The Technology Division provides for the education of technicians at the post-secondary school level in order to develop their ability to apply engineering, scientific, business and professional concepts to trade, industry, research, business and professional operations in their chosen field.

The Industrial Division provides pre-employment occupational and trades training in over 35 different vocational areas as well as providing the in-school training for the indentured trades.

The Teacher Training Division has the responsibility for the pedagogical training of teachers for Industrial Arts, Vocational Industrial and Vocational Commercial courses in the Public Schools, Institutes and Vocational Centres of the Province.

The Extension Course Division provides up-grading and updating courses in most any area of training, where sufficient demand exists. These courses are normally given in evening sessions and over 3,000 Manitoba residents attend annually.

We invite you to consult with our staff, the guidance teachers in the High Schools, our graduates, and the employers of our graduates, for additional information and counselling which they can provide to ensure that a proper choice of a career has been made.

A. R. Low,
Superintendent.
## Index

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calendar of Events</td>
<td>7</td>
</tr>
<tr>
<td>Administrative Staff</td>
<td>3</td>
</tr>
<tr>
<td>Technology Division Faculty</td>
<td>9</td>
</tr>
<tr>
<td>General Information</td>
<td></td>
</tr>
<tr>
<td>Attendance</td>
<td>11</td>
</tr>
<tr>
<td>Board and Room</td>
<td>11</td>
</tr>
<tr>
<td>Book Store</td>
<td>12</td>
</tr>
<tr>
<td>Course Content</td>
<td>12</td>
</tr>
<tr>
<td>Dining Areas</td>
<td>12</td>
</tr>
<tr>
<td>Discipline</td>
<td>12</td>
</tr>
<tr>
<td>Dress</td>
<td>12</td>
</tr>
<tr>
<td>Financial Assistance</td>
<td>12</td>
</tr>
<tr>
<td>Field Trips</td>
<td>14</td>
</tr>
<tr>
<td>Guidance</td>
<td>14</td>
</tr>
<tr>
<td>Illness, Accidents and Injuries</td>
<td>14</td>
</tr>
<tr>
<td>Library</td>
<td>15</td>
</tr>
<tr>
<td>Lockers</td>
<td>15</td>
</tr>
<tr>
<td>Office Hours</td>
<td>15</td>
</tr>
<tr>
<td>Placement Service</td>
<td>15</td>
</tr>
<tr>
<td>Registration</td>
<td>15</td>
</tr>
<tr>
<td>School Hours</td>
<td>16</td>
</tr>
<tr>
<td>Student Administrative Council</td>
<td>16</td>
</tr>
<tr>
<td>Tools and Equipment</td>
<td>16</td>
</tr>
<tr>
<td>Requirements for Admission to Technology Courses</td>
<td>16</td>
</tr>
<tr>
<td>Examinations</td>
<td>16</td>
</tr>
<tr>
<td>Supplemental Examinations</td>
<td>17</td>
</tr>
<tr>
<td>Appeals</td>
<td>17</td>
</tr>
<tr>
<td>Certificates and Diplomas</td>
<td>17</td>
</tr>
<tr>
<td>Refunds</td>
<td>18</td>
</tr>
</tbody>
</table>

### COURSES:

#### Business Courses:
- Business Administration                                           23
- Secretarial Science                                                31

#### Engineering Courses:
- Building Technology                                                39
- Chemical Technology                                                45
- Civil Technology                                                    51
- Drafting Technology                                                 59
- Electrical Technology                                               65
- Electronic Technology                                               71
- Instrumentation Technology                                          77
- Mechanical Technology                                               83

#### Certificate Courses:
- Library Assistants                                                  93
- Operating Engineers                                                 97

#### Medical Courses:
- Medical Laboratory Technology                                       103
- Medical Radiological Technology                                     107
- Combined Courses in Medical Laboratory Technology and Medical Radiological Technology 113
Calendar of Events
1967-68

1967

MONDAY  SEPTEMBER 4TH  Labour Day. School Closed
TUESDAY  SEPTEMBER 5TH  Registration—
                          8:30 a.m. for First Year Technology
                          Students
                          8:30 a.m. for Medical Radiological
                          Technology Students
                          1:30 p.m. for Second Year Technology
                          Students

WEDNESDAY  SEPTEMBER 6TH  8:30 a.m. Classes in all Technologies begin

MONDAY  SEPTEMBER 18TH  8:30 a.m. Registration: Medical Laboratory
                          Technology

TUESDAY  SEPTEMBER 19TH  Final date for late Registration

MONDAY  OCTOBER 9TH  Thanksgiving Day

FRIDAY  DECEMBER 22ND  Last day of classes before Christmas
                        Vacation

TUESDAY  DECEMBER 26TH  Boxing Day. School Closed

WEDNESDAY  DECEMBER 27TH  Office re-opens

1968

TUESDAY  JANUARY 2ND  Office re-opens

WEDNESDAY  JANUARY 3RD  8:30 a.m. Institute reopens

WEDNESDAY  JANUARY 3RD  8:30 a.m. Registration for Medical
                          Radiological Technology

WEDNESDAY  JANUARY 17TH  First and Third Term Final Examinations
                          begin

FRIDAY  JANUARY 26TH  First and Third Term Final Examinations
                        end

SATURDAY  JANUARY 27TH  Mid-term break begins

MONDAY  FEBRUARY 5TH  Registration—
                        8:30 a.m. for Second Term Technology
                        students
                        10:00 a.m. for Fourth Term Technology
                        students

MONDAY  FEBRUARY 5TH  1:15 p.m. Classes in all Technologies begin

THURSDAY  APRIL 11TH  Last day of classes before Easter recess

FRIDAY  APRIL 12TH  Easter Friday. School Closed

MONDAY  APRIL 15TH  Easter Monday. No Classes

TUESDAY  APRIL 16TH  Institute reopens after Easter recess

THURSDAY  APRIL 25TH  Open House for High School Students

FRIDAY  APRIL 26TH  Open House for High School Students

MONDAY  MAY 20TH  Victoria Day

MONDAY  JUNE 17TH  Second and Fourth Term Final Examinations begin

FRIDAY  JUNE 28TH  Second and Fourth Term Final Examinations end

FRIDAY  JUNE 28TH  Convocation

TUESDAY  JULY 2ND  Departmental Summer School opens
Administrative Staff


General Administration:

Office Manager

Supervisor of Curriculum, Guidance and Testing . . . . . . H. V. F. HUME, B.Sc., B.Ed.

Supervisor of Teacher Training . . . . . . P. F. PENNER, B.A.

Supervisor of Auxiliary Services . . . . . . G. S. ROSS, B.Sc.

Librarian . . . . . . . . . (Mrs.) G. DAKSHINAMURTI, M.A.

Technology Division:


Assistant Principal . . . . . . R. A. DUNHAM, B.Sc., B.Ed.

Industrial Division:

Principal . . . . . . . . . G. L. TALBOT, B.Ed., (Ind. Arts)

Assistant Principal . . . . . . J. GREENAWAY, B.Sc., P.Eng.
Faculty

Technology Division

A. ALFORD, B.Sc., B. Comm. . . . . . Business Administration
S. BALLENDINE (Mrs.) . . . . . . . Secretarial Science
R. M. BARR, B.Sc. . . . . . . . . . Mathematics
A. L. BERG, B. Comm. . . . . . . . Business Administration
E. M. BUNIO, B.Sc., (C.E.), P.Eng . . . Civil Technology
A. DERKSEN, (Miss), R.I.A . . . . . Business Administration
M. DROZD, (Miss), B.Sc., (Bus. Adm.) . Secretarial Science
W. DYCIIUK, B.Sc., A.G.I.S. . . . Chemical Technology
W. P. DYCK, B.Sc. . . . . . . . Chemical Technology
B. G. FAST, (Mrs.), R.T . . . . . . . Technician
I. FERGUSON, (Mrs.), R.T . . . . . . . Technician
D. D. FERRIES, B.A., B.Ed . . . . . English
J. FRIESEN, B.Sc., (Hons.), M.Sc., B.Ed . Chemical Technology
G. M. GRAMEK, (Miss), R. T . . . . . Technician
A. H ARMS, B.Sc., (M.E.), P.Eng . . Instrumentation Technology
G. D. HERMANSON, B.Sc., (C.E.), O.L.S., P.Eng . Civil Technology
F. B. HILL, C.E.T . . . . . . . . Electronic Technology
E. HIRST, (Miss), B.Sc., A.R.T . . Medical Laboratory Technology
S. S. HODGE, B.Sc., (E.E) . . . . . Electrical Technology
C. H. HOWARD, B.Sc., (C.E) . . . . . Civil Technology
C. M. HOWLETT, (Miss), R.N., L.C.S.L.T . . Medical Laboratory Technology
W. G. CHUBATY, B.Comm. . . . Business Administration
J. ISON . . . . . . . . . . . . . . English
J. H. KAMINSKY, (Miss), B.Sc., A.R.T . . . . . . Medical Laboratory Technology
J. KAPLAN, B.Sc., M.Ed . . . . . . Physical Education
D. B. KENNEDY, B.A . . . . . . English
E. S. KOLASKI, B.Sc., (C.E.), P.Eng . . . Civil Technology
L. LAZAR, C.E.T . . . . . . . . . . Drafting Technology
A. N. LEITE, C.E.T. 
W. MOFFAT, B.Sc., (Hons.) 
G. MORRISON, B.Sc., (C.E.) 
L. E. McLennan, (Mrs.), L.C.S.L.T. 
E. C. PATTERSON, (Mrs.) 
N. W. PEITSCH, B.Sc., (M.E.) 
A. M. PENNER, A.R.T. 
G. B. PERRIN, (Miss), B.A., B.Ls. 
R. D. POLLOCK, B.Sc., (Phys. Ed.) 
W. A. G. PORTER, B.A. 
A. H. ROBBINS, B.Sc., (E.E.), M.I.E.E.E. 
L. ROSS, B.Sc., (Hons.), M.Sc., M.C.I.C. 
J. SAGAN, (Miss), R.T. (C.S.R.T.) 
N. SATO, (Miss), B.Sc., A.R.T. 
D. H. SHAND 
S. W. SHERE, B.Sc., M.A.M.S., M.E.M.S. 
E. S. SMENDZIUK, B.Sc., (C.E.), P.Eng. 
S. E. SOLUMUNDSON, B.Sc., (C.E.) 
B. G. SZEBELEDY 
G. S. THURSTON, B.A. 
D. G. TRENHOLM, B.Comm. 
J. TSUJIMOTO, (Miss), B.Sc., (L.A.) 
R. G. VINET, B.A., B.Ed. 
D. J. WEIDEMAN, B.Comm. 
L. WHITE, (Mrs.), R.T. 
H. WILSON, B.Sc., (M.E.), P.Eng. 
W. YANCHYSHYN, B.A. 
V. H. YOUNG, B.A., B.Paed., B.Ed.
General Information

The Manitoba Institute of Technology is located in the north-west sector of Winnipeg, adjacent to the International Airport. The Institute has over seven acres of floor space containing the most up-to-date facilities and equipment. It is actually three schools in one:

1. The Technology Division, offering technology courses for high school graduates interested in pursuing a technical or business career.
2. The Industrial Division, offering apprenticeship training and pre-employment training in the trades and other areas.
3. The Teacher Training Division, offering three courses in teacher training: Business Education, Industrial Arts and Vocational Industrial.

Separate calendars are available for each of the above Divisions.

Over 50 courses are offered in full-time day programs. Night school courses are offered for the purpose of up-grading those who are employed in business and industry in any area where the need arises.

The Vocational Centres at The Pas and Brandon, together with the Manitoba Institute of Technology play an important role in meeting the ever increasing need for a qualified work force for our expanding economy.

The operation of these institutes is the responsibility of the Vocational Branch, Department of Education.

Attendance:

Students must be punctual and have an attendance of 90% or better in each subject. When a student remains away from school for a period of five consecutive school days, without notifying the Institute as to the reason for his absence, the student shall be considered as discontinuing his course.

Board and Room:

No dormitories are operated in connection with the Manitoba Institute of Technology. The General Office has a list of boarding houses for students who wish to obtain board and room in the city. Because this list changes from day to day, we recommend that you obtain it on or before the day of registration. The acceptability of all boarding places listed is left entirely to the discretion of the student.
Book Store:
Textbooks and supplies may be purchased from the Manitoba Institute of Technology Book Store.

Course Content:
The course content listed herein is intended to provide information for the guidance of applicants in the selection of appropriate courses. It is not intended to be so rigid and inflexible that it restricts the initiative of teachers and students. In general, the courses will be conducted in accordance with the curriculum outlines but may, through consultation between the Institute authorities and the Advisory Committees, be subject to revision to meet special educational needs as they arise.

Dining Areas:
The modern dining areas at the Institute provide excellent, low cost meals during the mid-day break periods.

Discipline:
Students are expected to exhibit adult behaviour. All students are subject to the rules and regulations of the Institute and may be suspended or dismissed if their conduct, progress, attendance, or attitude proves unsatisfactory. The Institute reserves the right to dismiss at any time, students who are unable or unwilling to profit from instruction. In such cases, no portion of the fee is refundable.

Students are required to complete all assignments of homework.

Dress:
Students are expected to dress in a neat and tidy manner, appropriate to the classroom, laboratory or workshop in which they are working.

Financial Assistance:
Unfavorable financial circumstances need not deter deserving students from enrolling in the Manitoba Institute of Technology. Assistance is available in the form of interest free loans, bursaries, and scholarships.

1. Canada Student Loans Plan:
This plan is designed to make bank loans (up to $1000.00 per year) available to students who need financial help to enable them to engage in full-time studies above high school level. Application forms are available at the Manitoba Institute of Technology.
2. St. James Kiwanis Golden Anniversary Loan Fund:

This fund provides for short term emergency loans ($5.00 - $25.00) to assist M.I.T. students in meeting unforeseen financial difficulties. Application forms are available at the Manitoba Institute of Technology.

3. Department of Education Bursaries:

Applicants for admission and students presently enrolled may apply for bursaries to: The Student Aid Office, Department of Education, Room 408 - 1181 Portage Avenue, Winnipeg 10, Manitoba.

These awards are based upon financial need and scholarship.

4. Children of War Dead (Education Assistance) Act:

Tuition fees and monthly allowances are provided for children of veterans whose deaths were attributable to military service. Inquiries should be directed to the nearest district office of The Department of Veterans Affairs.

5. Allowances:

Persons who are unemployed or underemployed may, under new Federal Government regulations, be entitled to living allowances and other personal benefits.

Information regarding these benefits can be obtained from your nearest Canada Manpower Centre.

6. Scholarships:

A number of scholarships, bursaries and prizes are available to M.I.T. students through the generosity of interested business firms, organizations and individuals.

The American Society for Metals (Manitoba Chapter) Scholarships ($25.00) to a student in First Year Mechanical Technology having the highest standing in "Manufacturing Processes".

Bristol Aerospace Ltd., Scholarships (two at $100.00 each) to students entering the Third Term of Electronic and Mechanical Technology.

Crane Supply Limited — A $25.00 award for the best Utilidor Design Project in Course M-314 Plant Engineering in Mechanical Technology.
The T. Eaton Company Limited Bursaries (two at $100.00 each) to students entering the Third Term of Business Administration.

The International Nickel Company of Canada Scholarships (five at $100.00 each) to students in Chemical, Civil, Electrical, Electronic and Mechanical Technologies.

The Manitoba Electrical Association Scholarship ($100.00 plus an equal amount from the Provincial Government) for a student in the Third Term of Electrical Technology.

The Manitoba Sugar Company Limited Annual Bursary ($200.00) to a student in Operating Engineers who completes Term I successfully.

The O'Keele Brewing Company Bursary (one at $200.00 and another at $100.00) for students in Operating Engineers who complete Term I successfully.

Co-op Vegetables Oils Ltd., Scholarship ($50.00) for a student in Operating Engineers.

Field Trips:

The work at the Institute is closely related to the work of industry. It is the policy of the schools to encourage field trips to outstanding establishments closely related to the students' studies. Students are expected to bear their own expenses, if any, on these trips.

Guidance:

Vocational and Educational guidance is available to applicants and students.

Illness, Accidents and Injuries:

The Manitoba Institute of Technology reserves the right to call a physician in case of illness, the expense to be borne by the student.
The Institute has exerted and will continue to exert every effort to avoid accidents, but incorporates the following statement as part of the understanding between themselves and their students: "The Province of Manitoba, its officers, agents, or employees assume no liability, expressed or implied for the result of sickness or accidents involving personal injury to any student, whether in connection with the Institute's instruction program wherever conducted, or incidental to other activities on the Institute’s properties or elsewhere."

Filing of an application form carries with it approval and consent with respect to the Institute policy governing accidents or illness as hereon set forth.

A Safety Program is a continuous operation at all times in all Departments.

Students should consider obtaining adequate Medical, Hospital and accident insurance coverage for the period while they are attending the Institute.

Library:

The Institute Library functions as a centre through which students and faculty are enabled to carry on many of their research study and recreational activities. The library collection, consisting of textbooks, reference materials, magazines, indexes, and newspapers provide both the breadth and the specialization of resources necessary for study in the diverse fields of Technical, Industrial and Business Education. It is open from 8:30 a.m. to 5:00 p.m., Monday through Friday.

Lockers:

Lockers are available without cost to full-time students.

Office Hours:

The General Office is open from 8:00 a.m., until 5:00 p.m., Monday through Friday.

Placement Service:

Technology Division - Mrs. A. Armstrong - telephone 783-8570
Industrial Division - Mr. J. C. Purse - telephone 783-8570

To meet the need for an effective placement service for all students, the Winnipeg Office of Canada Manpower Centre has established a student Placement Office at the Institute. All students will be given the opportunity to register with the Student Placement Office while attending courses at the Institute.

Registration:

Tuition fees are due and payable on the date of registration.
School Hours:
Classes are in session from 8:30 a.m., until 4:05 p.m., five days per week, Monday through Friday.

Student Administrative Council:
There is an active Student Council at the Manitoba Institute of Technology. Membership for this Student Organization gives a student many advantages. The Student Council levies a membership fee based on the duration of the course at the time of registration.

Tools and Equipment:
Relatively expensive tools and equipment are made available to the students by the Institute. Certain items which for sanitary or other reasons should be personal property, are purchased by the student.

Requirements for Admission to Technology Courses:
All applicants for admission are required to:
1. Apply in writing using the approved application form for the Technology Division. This application must be accompanied by the $15.00 registration fee which is refundable only if the application is rejected.
2. Hold at least the minimum academic pre-requisite listed under each course.
3. Submit an official transcript of their high school marks (Grade XI and XII) which must accompany the application. These official transcripts may be obtained from: The Registrar's Office, Department of Education, 408 - 1181 Portage Ave., Winnipeg 10, Manitoba. Action on the application cannot be finalized until this official transcript has been received by the Manitoba Institute of Technology.
4. Applications must be received or postmarked not later than midnight, August 31st.
5. Be 16 years of age or over.
6. Be physically qualified in reference to the type of course selected.
7. When the number of applicants exceeds the accommodation available, the Board of Admissions reserves the right to accept those applicants who are considered most likely to succeed.

Examinations:
Final examinations are conducted at the end of each term. Term marks based on student assignments, progress tests, etc., are incorporated with the results of the final term examinations to determine the final term mark.
Supplemental Examinations:

1. A student must not have more than two subject failures in order to register for the next term.

2. If a student has subject failures but is permitted to continue into the next term, he (she) must write supplemental examinations within two weeks of the commencement of that term.

3. If failures occur in these supplemental examinations the student will be allowed to proceed with the term work but must clear these supplementals at a special examination sitting, to be given at the end of the term.

4. Any student who fails one or more supplementals after two successive sittings will be required to withdraw from the course.

5. If these subjects are later cleared in evening classes, it may be possible to re-admit the student to the day school program.

6. Students who are repeating a term or who have transferred to another course must take all the subjects prescribed for the course regardless of previous credits obtained.

7. A student wishing to enroll for a term previously failed must submit an application to the Institute through the normal channels. The acceptance of such applications is at the discretion of the Admission Committee.

Appeals:

All subject failures are carefully scrutinized before the final mark is recorded. Appeals, therefore, cannot be considered unless they are substantiated by a Medical Certificate.

Certificates and Diplomas:

1. Certificates of Attainment are awarded to students who successfully complete the course in Library Assistants or Operating Engineering.

2. National Diplomas are awarded to students who successfully complete Technology Courses of two years' duration. These will be designated as:

   (a) Diploma in Technology (Dipl. T.) for graduates of the Engineering Technologies.

   (b) Diploma in Applied Arts (Dipl. A.A.) for graduates of Business Administration and Secretarial Science.

   The above regulations do not apply to the Medical Laboratory Technology or Medical Radiological Technology Courses.
Refunds:

1. Fees are collected on a term basis at the time of registration.

2. Where a satisfactory reason for withdrawal has been given to the Principal, he may recommend that a refund be granted to the student.

3. In those cases where refunds are granted, the following will apply:

**FIRST TERM STUDENTS:**

(a) Students withdrawing before the final date for late registration will be granted a refund of the full amount paid less the $15.00 registration fee.

(b) Students withdrawing after the final date for late registration but before the end of the first full calendar month of instruction will be granted a refund of the full amount paid less $35.00 ($15.00 registration fee plus $20.00 per month tuition).

(c) Students withdrawing during the second calendar month of instruction will be granted a refund of the full amount paid less $55.00.

(d) No refunds will be granted after the second full calendar month of instruction, but if a student transfers to an Industrial Division Course, credit up to the amount of the unused portion may be applied towards the payment of the fees of that course.

**SECOND, THIRD AND FOURTH TERM STUDENTS:**

(a) Students withdrawing before the end of the first full calendar month of instruction will be granted a refund of the full amount paid less $20.00.

(b) Students withdrawing during the second full calendar month of instruction will be granted a refund of the full amount paid less $40.00.

(c) No refunds will be granted after the second full calendar month of instruction, but if a student transfers to an Industrial Course, credit up to the amount of the unused portion may be applied towards the payment of fees of that course.
**Courses...**

<table>
<thead>
<tr>
<th><strong>Business Courses</strong></th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Administration</td>
<td></td>
</tr>
<tr>
<td>Secretarial Science</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Engineering Courses</strong></th>
<th>37</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Technology</td>
<td></td>
</tr>
<tr>
<td>Chemical Technology</td>
<td></td>
</tr>
<tr>
<td>Civil Technology</td>
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<td>Drafting Technology</td>
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<td>Electrical Technology</td>
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<tr>
<td>Electronic Technology</td>
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<tr>
<td>Instrumentation Technology</td>
<td></td>
</tr>
<tr>
<td>Mechanical Technology</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Certificate Courses</strong></th>
<th>91</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library Assistants</td>
<td></td>
</tr>
<tr>
<td>Operating Engineers</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Medical Courses</strong></th>
<th>101</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Laboratory Technology</td>
<td></td>
</tr>
<tr>
<td>Medical Radiological Technology</td>
<td></td>
</tr>
<tr>
<td>Combined Courses in Medical Laboratory and Radiological Technology</td>
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* TECHNOLOGY COURSES OFFERED BY THE VOCATIONAL CENTRES, 
AT BRANDON AND THE PAS ARE:

**BRANDON . . .**

- Electrical Technology
  - (Course description as shown in calendar for M.I.T.—Technology Division.)
- Welfare Services

**THE PAS . . .**

- Mining Technology

**Note:** Separate calendars for these institutes are available.
Business Courses
Business Administration

Entrance Requirements:

1. Grade XII (Business Education, General or University Entrance Course).
2. Junior Matriculation or its equivalent if secured prior to December 31, 1963. (Another option is acceptable in place of a second language).

Length of Course:

TWO SCHOOL YEARS, each of ten months duration, leads to a Diploma in Applied Arts. (Dipl. A.A.) Each of the ten month periods is divided into two equal terms with final term examinations written at the end of each term. Classes commence in September of each year.

Fees and Expenses:

The tuition fee for the course in Business Administration is $100.00 for each of the four terms. Other expenses include books, incidentals, board and lodging.

Employment Possibilities:

During the past decade, statistics show that there has been a very significant shift of employment to office occupations. Paralleling this shift to office occupations and the rapid increase of staff, has been a comparable increase in division of responsibility. Business and Industry can no longer wait for long periods of time to completely develop selected employees for key positions in administraton and management.

There are three specific types of management, particularly in the large companies. Personnel management is concerned with the direction of employees; production management is responsible for producing goods or services; and sales management has the job of selling the goods or services produced.

For the well-trained person who possesses initiative, leadership qualities and vision, opportunities for administrative employment exist in almost every type of business enterprise in Manitoba.
COURSE OUTLINE

First Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>COURSE</th>
<th>TERM 1</th>
<th>HOURS per WEEK</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Lect.</td>
<td>Lab.</td>
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<tr>
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<td>G-111</td>
<td>Psychology</td>
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<td>BU-101</td>
<td>Accounting</td>
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<tr>
<td>BU-102</td>
<td>Economic Principles</td>
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<td>BU-103</td>
<td>Marketing</td>
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<td>BU-104</td>
<td>Business Law</td>
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<td>BU-105</td>
<td>North American Economic Development</td>
<td>3</td>
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<tr>
<td>BU-107</td>
<td>Mathematics or Typewriting and Business Machines</td>
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</tr>
<tr>
<td>PE-101</td>
<td>Physical Education</td>
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</table>

19 12

Depending on the High School program taken by the student either BU-107 or BU-119 will be taken.

TERM 2

<table>
<thead>
<tr>
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<td>G-211</td>
<td>Psychology</td>
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<td>BU-201</td>
<td>Accounting</td>
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<td>BU-202</td>
<td>Economic Principles</td>
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<td>BU-203</td>
<td>Marketing</td>
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<tr>
<td>BU-204</td>
<td>Business Law</td>
<td>1</td>
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<tr>
<td>BU-207</td>
<td>Mathematics of Finance</td>
<td>2</td>
</tr>
<tr>
<td>BU-215</td>
<td>Business Organization</td>
<td>3</td>
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<tr>
<td>PE-201</td>
<td>Physical Education</td>
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</tbody>
</table>

21 10

In Terms I and II, Courses BU-119 and BU-207 are taught concurrently with one-half the students enrolled in each course in Term I and reversed in Term II.
## Second Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course</th>
<th>TERM 3</th>
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<tbody>
<tr>
<td>BU-301</td>
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<td></td>
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<tr>
<td>BU-302</td>
<td>International Economics</td>
<td></td>
<td>3 0</td>
</tr>
<tr>
<td>BU-308</td>
<td>Statistics</td>
<td></td>
<td>3 2</td>
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<tr>
<td>BU-310</td>
<td>Merchandising</td>
<td></td>
<td>3 1</td>
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<tr>
<td>BU-311</td>
<td>Advertising Sales</td>
<td></td>
<td>3 1</td>
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<tr>
<td>BU-312</td>
<td>Business Finance</td>
<td></td>
<td>3 2</td>
</tr>
<tr>
<td>BU-318</td>
<td>Speech</td>
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</table>

**TERM 4**

<table>
<thead>
<tr>
<th>Course No.</th>
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<th>HOURS per WEEK</th>
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</thead>
<tbody>
<tr>
<td>BU-401</td>
<td>Accounting (Systems &amp; Data Processing)</td>
<td>3 2</td>
</tr>
<tr>
<td>*BU-410</td>
<td>Merchandising</td>
<td>3 1</td>
</tr>
<tr>
<td>BU-413</td>
<td>Business Communications</td>
<td>2 3</td>
</tr>
<tr>
<td>*BU-414</td>
<td>Statistical Analysis</td>
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</tr>
<tr>
<td>BU-415</td>
<td>Business Management</td>
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<tr>
<td>BU-416</td>
<td>Insurance Principles</td>
<td>3 1</td>
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<td>BU-417</td>
<td>Industrial and Personnel Relations</td>
<td>3 1</td>
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<tr>
<td>*BU-418</td>
<td>Intermediate Accounting</td>
<td>2 2</td>
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<tr>
<td></td>
<td></td>
<td>23 11</td>
</tr>
</tbody>
</table>

* These are optional courses of which two must be selected.

### COURSE DESCRIPTIONS

**G-110 English**

Review of grammar and composition; effective organization and communication of ideas; the library and literature searching.

**G-111 Psychology**

This course is designed to help students understand self and human behaviour through study and discussion; science of psychology; normal development of the individual; individual differences; intelligence; learning and remembering; emotions and emotional behaviour; motivation and frustration; perception; attitudes and opinions; self-understanding and self-development.

**BU-101 Accounting**

Double entry bookkeeping routine; special journals; subsidiary ledgers and control accounts; adjustments for the preparation of financial statements, financial statements pertaining to sole proprietorship; notes and interest; accounts receivable; inventories.

**BU-102 Economic Principles**

An introduction to the basic principles of economics including the basic aims of economic activity, the basic forms of economic systems, the basic forms of business organization, the theory of prices and output under degrees of competition and application of these theories; monopoly and its control; principles of income determination.
BU-103 & BU-203 Marketing
A study of industrial and consumer marketing with emphasis on marketing institutions and principles including trade channels, packaging, branding, pricing, product planning and the integration of these activities into the marketing system as a whole.

BU-104 & BU-204 Business Law
Summary of our laws of contract; guarantee and suretyship, agency, master and servant, mortgages, mechanics' liens; personal property; sale of goods, conditional sales; interest; bailment; limitation of actions; bills of exchange.

BU-105 North American Economic Development
A historical study of the economic growth of North America through the 19th and 20th centuries; cause and effect up to the current situation.

BU-107 Mathematics
A make-up course in Mathematics to provide the necessary foundation for the courses, Mathematics of Finance and Statistics.

BU-119 Typewriting and Business Machines
A course designed to permit the achievement of typewriting skill with an elementary understanding of business correspondence, manuscript, columnar arrangement and business forms.
The student develops knowledge of and skill in the use of standard office calculating, adding, dictating, and duplicating machines of various manufacturers.

G-210 English
This course is basically concerned with written communications; note-taking; outlines; business correspondence; report writing and essays.

G-211 Psychology
This course is concerned with personal contacts; employee relations in business and industry, customer relationships; psychology in advertising and selling; community and home relations.

BU-201 Accounting
Fixed assets and depreciation; partnership accounts, formation, operation and liquidation; formation of limited companies; share capital and surplus; bonds payable; investments; voucher system; payroll; departmental agency and branch accounts; manufacturing accounts.

BU-202 Economic Principles
A continuation of course BU-102 including the theory of wage determination, history of trade unions and trade union activities, the theory of rent, interest, and profit as a price, public finance, money and banking, national income and national product, business cycles, theory of economic stabilization by government action, economic growth and progress.

BU-207 Mathematics of Finance
Mathematics applied to business problems; installment payments, compound interest, annuities, investment, etc.

BU-215 Business Organization
The structure of business; manufacturing, wholesaling, retailing; sole proprietorships, partnerships, limited companies and co-operatives; plant location and layout; finance; personnel office organization and practice; taxes and government control of business.
BU-301 Accounting
The application of accounting principles by means of practical material and problems; concentration on specific projects assigned on an individual basis; introduction to accounting systems and integrated and electronic data processing emphasizing the place of mechanization and automation.

BU-302 International Economics
A continuation of Course No. BU-105 with particular attention paid to specific areas such as the U.K., Western Europe and Japan and the implication with respect to Canadian Economics; a compact summary of the principle issues facing the Canadian firm in a foreign field.

BU-308 Statistics
An introductory course in economic and business statistics covering such areas as: initiation of a statistical investigation; design of samples; tabulation of data; interpretation of data; measures of location and variation; time series.

BU-310 & BU-410 Merchandising
A study of the internal merchandising mechanism of retail organizations; how to establish pricing policies; calculating markup required; controlling markdowns; controlling stock shortages; evaluating inventory by cost and retail methods; measuring stock turnover; analysing sales and stock records; planning sales and expenses; factors in profit and loss.

BU-311 Advertising Sales
Advertising as a direct selling force and as a factor in distribution; advertising campaigns; analysis of mediums, commodities and markets. Selling policies; sales and market research; sales programs and promotion. Both lectures and case studies will be used to acquaint the student with advertising layout, media strategy, advertising campaigns, and evaluation of effectiveness.

BU-312 Business Finance
A course to provide fundamental knowledge in finance and the basic workings of our financial system and to develop skill in solving financial problems; financial analysis and control; planning; cash flow; sources of business funds; investments and expansion.

BU-318 Speech
This course is basically concerned with the types of oral communication emphasizing the fundamental principles of thought, content, organization and delivery; formal speeches, panel discussions, debates, conferences, interviews, etc.

BU-401 Accounting
The application of accounting principles by means of practical material and problems; concentration on specific projects assigned on individual basis.

BU-413 Business Communications
This course deals with the combination of written and oral communications with individual projects assigned; dictation and writing of correspondence; report and article writing with presentation, etc. Particular emphasis is placed on the development of individual style adapted to accepted and proven techniques.

BU-414 Statistical Analysis
Introduction to quality control; sampling and statistical inference; index numbers; probability, expectation and decision making; time series analysis; techniques in the effective application of statistical programs.

BU-415 Business Management
The principles and practices of business management, planning, organizing, actuating and controlling; the application of the principles of management to the various departments in the business structure.
BU-416 Insurance Principles
Principles of risk management and insurance; nature of risk; economic effects; law of large numbers and theory of insurance; history and development of insurance as an institution; types of carriers; the various types of insurance contracts and their interpretation; risk management; the functional departments of an insurer; regulation of insurance companies.

BU-417 Industrial and Personnel Relations
A survey of the multiple facets of personnel management including the principle problems and the techniques of their solutions.

BU-418 Intermediate Accounting
Investments in stocks, bonds, funds and miscellaneous items; plant and equipment - acquisition, use, retirement, depreciation, depletion, revolutions; intangibles; long-term debt; share capital-upon formation of limited company, changes subsequent to formation; retained earnings, earnings distribution, appropriations, the statement; statement from incomplete records; financial statement analysis — use of comparative data, special ratios and measurements; statement of application of funds.
Secretarial Science

Entrance Requirements:

1. Grade XII (Business Education, General or University Entrance Course).
2. Junior Matriculation or its equivalent if secured prior to December 31, 1963. (Another option is acceptable in place of a second language).

Length of Course:

TWO SCHOOL YEARS, each of ten months duration, leads to a Diploma in Applied Arts. (Dipl. A.A.) Each of the ten month periods is divided into two equal terms with final examinations written at the end of each term. Classes commence in September of each year.

Fees and Expenses:

The tuition fee for the course in Secretarial Science is $100.00 for each of the four terms. Other expenses include textbooks, incidentals, board and lodging.

Employment Possibilities:

The purpose of the Secretarial Science curriculum is to train, in a full two-year program, private secretaries and assistants to management who will satisfy the requirements of the most exacting executives. The course is designed for both young men and women. Secretarial training provides a quick route to junior executive positions in the case of young men. Highly skilled secretaries are in great demand.

Many of the graduates may go to private secretarial positions in the larger organizations. Others may find excellent positions in smaller offices where they may have greater responsibilities and a wider variety of duties.
# COURSE OUTLINE

## First Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>COURSE</th>
<th>HOURS per WEEK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>TERM 1</strong></td>
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<tr>
<td>SS-102</td>
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<td>Basic Shorthand</td>
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<td>Introduction to Business</td>
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<td>SS-202</td>
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<tr>
<td>SS-203</td>
<td>Basic Shorthand &amp; Transcription</td>
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<tr>
<td>PE-201</td>
<td>Physical Education</td>
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<td></td>
<td><strong>Second Year</strong></td>
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## Second Year

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<tr>
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<td>BU-318</td>
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<td>Advanced Shorthand &amp; Transcription</td>
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<td>SS-305</td>
<td>Sociology</td>
<td>3</td>
</tr>
<tr>
<td>SS-306</td>
<td>Introduction to Business Adminstration</td>
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<tr>
<td>SS-309</td>
<td>Secretarial Science and Personal Development</td>
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<td>Statistics</td>
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<td>BU-413</td>
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<td>SS-403</td>
<td>Advanced Shorthand &amp; Transcription</td>
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<td>SS-405</td>
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<td>SS-406</td>
<td>Introduction to Business Administration</td>
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<tr>
<td>SS-409</td>
<td>Secretarial Science and Personal Development</td>
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<td>Business Mathematics</td>
<td>2</td>
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</tr>
</tbody>
</table>

### COURSE DESCRIPTIONS

**G-110 English**
Review of grammar and composition; effective organization and communication of ideas; the library and literature searching.

**G-111 Psychology**
This course is designed to help students understand self and human behaviour through study and discussion; science of psychology; normal development of the individual; individual differences, intelligence; learning and remembering; emotions and emotional behaviour; motivation and frustration; perception; attitudes and options; self-understanding and self-development.

**BU-101 Accounting**
Double entry bookkeeping routine; special journals; subsidiary ledgers and control accounts; adjustments for the preparation of financial statements; financial statements pertaining to sole proprietorship.

**BU-102 Economic Principles**
An introduction to the basic principles of economics including the basic aims of economic activity, the basic forms of economic systems, the basic forms of business organization, the theory of prices and output under degrees of competition and application of these theories; monopoly and its control; principles of income determination.

**SS-101 & SS-201 Secretarial Science**
This is an introductory course in general office procedures which will cover a wide variety of topics such as: filing systems; business machines; mail procedures; communication systems; equipment and supplies; typewriting production; public relations.

**SS-102 Typewriting**
This course is designed to provide an intensive course in touch typing skill with an elementary understanding of business correspondence, manuscripts, tabulation, and business forms, and the building of speed skills.

**SS-103 Basic Shorthand**
A course designed to provide the students with the basic theory of shorthand and with the ability to take familiar dictation at an increasing rate of speed.

**SS-104 Introduction to Business**
To acquaint the student with business vocabulary, business activity, ownership, organization, purchasing, production, marketing, finance, managerial problems, personnel problems, business regulation, and taxation. This course should have the effect of business orientation or indoctrination and to provide a background upon which future courses can be based for more specific study.
PE-101 & PE-201 Physical Education

The Physical Education program provides students with the opportunity to maintain a high level of physical fitness and to gain knowledge and experience in a wide variety of individual, dual, and team sports.

G-210 English

This course is basically concerned with written communications; note-taking; outlines; business correspondence; report writing and essays.

G-211 Psychology

This course is concerned with personal contacts, employee relations in business and industry, customer relationships, psychology in advertising and selling, community and home relations.

BU-201 Accounting

Partnership accounts, operation and liquidation; formation of limited companies; share capital and surplus, bonds and investment securities; manufacturing accounts; departmental agency and branch accounts; analysis of financial statements.

BU-202 Economic Principles

A continuation of course BU-102 including the theory of wage determination, history of trade unions and trade union activities, the theory of rent, interest, and profit as a price, public finance, money and banking, national income and national product, business cycles, theory of economic stabilization by government action, economic growth and progress.

SS-202 Intermediate Typewriting

A course designed to further the students' typing abilities. Emphasis on increasing speed and retaining a high degree of accuracy; office production; electric typewriters.

SS-203 Basic Shorthand and Transcription

A course designed to review the basic theory and to increase the students' speed at taking dictation and in transcribing on the machines.

BU-104 & BU-204 Business Law

Summary of our laws of contract; guarantee and suretyship; agency, master and servant, mortgages, mechanics' liens; personal property; sale of goods; conditional sales; interest; bailment; limitation of actions; bills of exchange.

BU-318 Speech

This course is basically concerned with types of oral communications emphasizing the fundamental principles of thought, content, organization and delivery; formal speeches, panel discussions, debates, conferences, and interviews. The course should permit the correction of speech peculiarities, pronunciation and reticence towards participation in conversation and group discussions.

SS-302 & SS-402 Advanced Typewriting

To further increase speed and to sustain accuracy; to enable the student to obtain confidence.

SS-303 & SS-403 Advanced Shorthand and Transcription

Practice to obtain a dictation speed of at least 120 wpm with a high level of accuracy in transcription.

SS-305 & SS-405 Sociology

The nature and needs of man; the natural and cultural environment in which he satisfies these needs; the organization and revolution of the major social institutions established to meet his political, economic, educational and spiritual needs; the study of the origin and nature of the major political, economic, international and educational problems of our technological age and the urbanization of life in creating and providing means of solving these problems.
SS-306 & SS-406 Introduction to Business Administration

To provide a comprehensive study of the four main functions of finance, marketing, production and personnel with emphasis on management principles and methods of decision making; to provide an understanding of management problems to permit an assistant to management to function adequately at this level.

SS-309 & SS-409 Secretarial Science and Personal Development

For the training of an efficient secretary: office procedures and responsibilities; sources of information; travel, transportation and accommodation; preparation for conferences, seminars and meetings; banking procedures; financial records; office supervision and management; postal information; reports, manuscripts and legal documents; public relations; personality and appearance; social skills.

SS-317 Statistics

Statistical methods; statistical compilation; quantitative statistical relationships; presentation and interpretation of data.

BU-413 Business Communications

This course deals with the combination of written and oral communications with individual projects assigned; dictation and writing of correspondence; report and article writing with presentation, etc. Particular emphasis is placed on the development of individual style adapted to accepted and proven techniques.

SS-417 Business Mathematics

To provide an opportunity for the application of mathematics to business problems.
Engineering Technology Courses
Building Technology

Entrance Requirements:

1. Grade XII standing (Vocational Industrial, General or University Entrance Course) with demonstrated proficiency in English, Mathematics and Physical Science (i.e. chemistry and physics).

2. Junior Matriculation or its equivalent if secured prior to December 31, 1963. (Another option is acceptable in place of a second language).

3. Special consideration will be given to prospective students who have completed Grade XI (or its equivalent) and who are also the holders of a Journeyman's Certificate in one of the construction trades.

Length of Course:

TWO SCHOOL YEARS, each of ten months duration, leads to a Diploma in Technology (Dipl. T.). Each of the ten month periods is divided into two equal terms with final term examinations written at the end of each term. Classes commence in September of each year.

Fees and Expenses:

The tuition fee for the course in Building Technology is $100.00 for each of the four terms. Other expenses include textbooks, incidentals, board and lodging.

Employment Possibilities:

The Building Technology course is designed to produce high level technicians who will have received intensive training in the field of project engineering such that they will be able to function as building project co-ordinators. In this course they will acquire an excellent knowledge of the construction trades, as well as considerable training in the field of job control, costing, specifications, estimating and work study. Students from this course will find work with contractors and construction firms.
COURSE OUTLINE

First Year

TERM 1

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course</th>
<th>Lect</th>
<th>Lab</th>
</tr>
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<tbody>
<tr>
<td>C-102</td>
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<td>3</td>
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<tr>
<td>C-110</td>
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</tr>
<tr>
<td>B-101</td>
<td>Drafting &amp; Sketching</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>B-102</td>
<td>Building Physics</td>
<td>3</td>
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</tr>
<tr>
<td>B-103</td>
<td>Building Science</td>
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</tr>
<tr>
<td>B-109</td>
<td>Mathematics</td>
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Total: 17 14

TERM 2

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<th>Lab</th>
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<td>Specifications and Reports</td>
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<td>B-202</td>
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<td>Stress Analysis</td>
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Total: 14 17

Second Year

TERM 3

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<td>Code Interpretation</td>
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TERM 4

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<td>Foremanship</td>
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<td>Construction Supervision</td>
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<td>B-425</td>
<td>Construction Procedures and Equipment</td>
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Total: 17 13
C-102 Mechanics
The basic concepts of statics and dynamics as applied in the analysis of structures. Forces, moments, free body diagrams, trusses, frames, friction, free falling bodies, motion of projectiles, work, energy and power.

C-110 English
Origin and growth of the English language; standards of modern English; words — dictionary; spelling; punctuation; basic grammar; sentence structure; basic sentence faults; effective paragraphs; essay writing, oral communication.

B-101 Drafting & Sketching
Principles of engineering drawing based on Canadian standards; lettering, scaling, dimensioning, instruments and their use, geometric drawing, orthographic projections, auxiliary views, sectioning, isometric drawing; blueprint reading, descriptive geometry; special projects involving inking.

Sketching materials and equipment, basic strokes and line practice, scale and proportion, pictorial structural details, collecting data on sketches, developing ideas and giving instructions by sketch.

B-102 & B-202 Building Physics
A study of physics related to the building trades: the physical properties and use of the major building materials, properties of solids, glass, paints, waves and vibrating motion, sound, sound waves, acoustics, light, sources of light, illumination, temperature, range of temperature and the related effect on building materials, humidity, insulations, weathering.

B-103 Building Science
Introduction to the building services: heating, lighting, air-conditioning, ventilating, waste-disposal requirements, water supply, acoustics, communications, power, the building services and their related control systems, vertical and horizontal transportation systems.

C-109 Mathematics
Algebra: Numerical computation, laws of exponents, radicals, significant figures, simple algebraic operations, quadratic equations, simultaneous equations; functions and their graphs, factoring, complex fractions, common and natural logarithms, interpretation, determinants, remainder and factor theorems, synthetic division, vectors. Use of slide rule.

Trigonometry: Trigonometric functions, interpolation and logarithms, solution of right triangles, area of right triangles, graphing by composition of ordinates, fundamental relations of trigonometry, inverse trigonometric functions, oblique triangles, straight lines and circles, theory of equations.

C-110 English
Origin and growth of the English language; standards of modern English; words — dictionary; spelling; punctuation; basic grammar; sentence structure; basic sentence faults; effective paragraphs; essay writing, oral communication.

PE-101 & PE-202 Physical Education
The Physical Education program provides students with the opportunity to maintain a high level of physical fitness and to gain knowledge and experience in a wide variety of individual, dual and team sports.

C-206 Specifications and Reports
Writing of letters, interdepartmental memorandums and reports. Interpretation of specifications as applied to Building Technology and the preparing and writing of said specifications.

Standard forms; requisitions, work orders, change orders, purchase orders, etc.

B 201 Drafting and Sketching
Drawing of structural steel frameworks and connections; reinforced concrete principles and drawing of structural concrete details; structural timber drafting including laminated construction, drawing of municipal structures using a sewer and water system.
B-204 Stress Analysis

Elastic theory, stress, strain and elastic moduli. Poisson's ratio, bolted and welded joints, the torsion equation applied to circular sections; shear force and bending moment diagrams; the bending equation; bending stress, shear equation and shear stress; combined stress systems; principal stresses; Mohr's stress circle; the three moment equation for continuous beams.

C-205 Surveying


B-209 Mathematics

Review of circles and loci, conics ellipse and parabola, solid analytical geometry. Calculus — meaning of variables, constants, functions, theorems on limits maxima and minima, continuous functions, delta process — slope relationship, differentiation of simple functions. Introduction to integral calculus.

Courses for Term III & IV are currently in the planning stage.
Chemical Technology

Entrance Requirements:
1. Grade XII standing (Vocational Industrial, General or University Entrance Course) with demonstrated proficiency in English, Mathematics and Physical Science (i.e. chemistry and physics).
2. Junior Matriculation or its equivalent if secured prior to December 31, 1963. (Another option is acceptable in place of a second language).

Length of Course:
TWO SCHOOL YEARS, each of ten months duration, leads to a Diploma in Technology (Dipl. T.). Each of the ten month periods is divided into two equal terms with final term examinations written at the end of each term. Classes commence in September of each year.

Fees and Expenses:
The tuition fee for the course in Chemical Technology is $100.00 for each of the four terms. Other expenses include textbooks, incidentals, board and lodging.

Employment Possibilities:
The technologist performs a special and indispensable role as a member of the scientific team in chemical research, product development, application, or production.

Since the Canadian Chemical Industry has experienced phenomenal growth in the last decade, there are many opportunities for students who possess the personal initiative and responsibility for the attainment of a diploma.

The Chemical Technologist may become employed as: Research Assistant, Chemical Analyst, Plant Control Chemist, Laboratory Experimentation Specialist, Salesman and Serviceman for Chemical Products and Equipment, etc.

The Chemical graduate finds employment in a wide variety of fields, such as foods, glass, rubber, building products, dyes, oils, lubricants, heavy chemicals, fuels, fertilizers, paper, paints, plastics, metals and government agencies.
This course is designed for women as well as men. There are many jobs for which the industry prefers women. Jobs that require a good colour sense, patience and precision. Working conditions in most of the employing firms are the kind that would be attractive to women. The laboratories are safe, quiet and clean. The work is interesting and challenging. This field provides a wonderful opportunity to the girl with better than average intelligence who does not plan or cannot afford higher education but is not satisfied with the usual job opportunities found in the clerical fields.

**COURSE OUTLINE**

*First Year*

<table>
<thead>
<tr>
<th>Course No.</th>
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<td>CH-101</td>
<td>General Chemistry</td>
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<td>CH-102</td>
<td>Descriptive Inorganic Chemistry</td>
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<td>CH-103</td>
<td>Inorganic Qualitative Analysis</td>
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<td>CH-105</td>
<td>Electricity &amp; Magnetism</td>
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**TERM 2**

|            |                                             | Lect.  | Lab.  |
|------------|---------------------------------------------|--------|
| G-202      | Mathematics                                 | 3      | 2     |
| CH-201     | Technical Report Writing                    | 3      | 0     |
| CH-203     | Inorganic Quantitative Analysis             | 2      | 6     |
| CH-204     | Organic Chemistry                           | 3      | 4     |
| CH-205     | Electronics                                 | 2      | 2     |
| CH-206     | Physics                                     | 2      | 2     |
| PE-201     | Physical Education                          | 0      | 1     |
|            |                                             | 15     | 17    |
# Second Year

## TERM 3

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<td>Economics</td>
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<tr>
<td>CH-304</td>
<td>Organic Chemistry</td>
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## TERM 4

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<tr>
<td>CH-402</td>
<td>Statistics &amp; Quality Control</td>
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<td>CH-405</td>
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<td><strong>Total</strong></td>
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<td><strong>17</strong></td>
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</table>

## COURSE DESCRIPTIONS

**G-101 English**

Use of the dictionary; sentence structure; punctuation; note-taking; writing precis and paraphrases; essays.

**G-102 Mathematics**

Numbers and their significance in making computations with measured values; powers of numbers; logarithms and the slide rule; trigonometry; vectors; complex numbers; determinants, quadratic and higher degree equations, straight line.

**CH-101 General Chemistry**

Atomic structure; energy levels and the periodic table; chemical bond; stoicheometry; the gaseous state; properties of liquids; types of solids, changes of state; solutions, colloids; chemical equilbrium; electrochemistry.

**CH-102 Descriptive Inorganic Chemistry**

Periodic classification of the elements; atomic structure; electronic theory of valence; the inert gases; hydrogen; alkali metals; alkaline earth metals; boron family; carbon, nitrogen, oxygen and halogen families; some transition elements.

**CH-103 Inorganic Qualitative Analysis**

Chemical equilibria; ionization; solubility product; complex ions, and other topics pertinent to a study of qualitative analysis; laboratory practice in separation and identification of cations and anions.

**CH-105 Electricity and Magnetism**

Electric current; A.C. circuits; D.C. circuits; electron tubes — diode, triode, multigrid and multi-unit tubes.
CH-106 Physics
Statics; kinematics; dynamics; energy; rotary motion; hydrostatics; elasticity; temperature; thermal expansion; radiation, conduction and convection; thermodynamics.

PE-101 & PE-201 Physical Education
The Physical Education program provides students with the opportunity to maintain a high level of physical fitness and to gain knowledge and experience in a wide variety of individual, dual and team sports.

G-202 Mathematics
Conics, loci, polar coordinates; solid geometry. Differential calculus and its use, \((x^n \text{ and } \sin x)\). Maxima and minima; increments. Integral calculus; area rules; integral of \(x^n \text{ and } \sin x\), work, velocity. Use of tables of differentials and integrals. Substitution. Integration by parts.

CH-201 Technical Report Writing
Technical writing; business letters; the library and literature searching; technical reports; technical and semi-technical publications.

CH-203 Inorganic Quantitative Analysis
The theory behind classical quantitative analysis as used in industry. Practical work involves mainly gravimetric and volumetric quantitative analysis.

CH-204 Organic Chemistry
A study of aliphatic organic chemistry and related topics including discussion on the characterization of organic compounds and the nature of organic reactions. Laboratory: development of basic laboratory techniques and preparation of representative organic compounds related to the theoretical study, including industrially important substances.

CH-205 Electronics
Cathode follower; paraffine amplifier; push-pull output circuits; photo-multiplier tubes; electrostatic and magnetic deflection; power supplies (half wave, full wave, bridge, doubler); basic oscillator; semiconductors; semiconductor circuits.

CH-206 Physics
Light - reflection, refraction, dispersion; interference and diffraction; lenses optical instruments; polarization; relativity; atomic physics; nuclear and nuclear energy; nuclear reactions.

G-302 Calculus
Definition and differentiation of inverse trigonometry, hyperbolic, and inverse hyperbolic functions; integration by parts and from C.R.C. tables; series, explanation and uses; partial differentials; multiple integration; Newton's method of finding a root; integration by partial fraction; introduction to differential equations.

CH-301 Economics
This course will acquaint the student with modern economic theory and its practical applications to the Chemical industry and the national economy. Heavy emphasis will be placed on the study of Canada's economy and problems peculiar to that industry. Topics will include business organization; theory of price; national income and income distribution; public finance; money and banking; international trade, etc.

CH-304 Organic Chemistry
Aromatic Organic Chemistry to include; structure and nomenclature, preparations and properties; functional group reactions; methods of identification and commercial uses of important members; aliphatic and aromatic hydrocarbons and their derivatives halogen, nitrogen, sulfur, mono and di-carboxylic acids; esters and fats; proteins; carbohydrates; amino com-
pounds; polynuclear hydrocarbons; etc. The fundamentals of stere-chemistry; geometrical and optical isomerism; tautomerism, resonance, simple reaction mechanism.

The laboratory will dwell on the techniques of Organic Chemistry and experiments related to the above topics.

**CH-305 & CH-405**

**Instrumental Chemical Analysis**

Discussion of errors; theory and instrumentation of visible and photoelectric colorimetry; fluorimetry; turbidimetry and nephelometry; spectrophotometry (ultraviolet, visible and infrared); spectrographic analysis (emission and raman spectra); flame photometry; gas detection and gas chromatography; radiochemistry; potentiometric titration and pH measurements, aqueametry; electrodeposition and polarography; coulometry and amperometry; conductometry; chemical microscopy; spectroscopic analysis by comparison; ion exchange and thin layer chromatography; electrophoresis; carbon, hydrogen and nitrogen analysis; X-ray methods; mass spectrometry; differential thermal analysis; atomic absorption spectrophotometry; electronic instrumentation related to chemical instruments; etc.

**CH-306 & CH-406**

**Physical Chemistry**

Ideal and non-ideal gas behaviour; the three laws of thermodynamics and their applications; general characteristics of liquids and solutions; colligative properties; thermochemistry (heat of reaction, heat of combustion, etc.); chemical equilibria; electrochemistry; electrical conductance; phase diagrams; chemical kinetics; surface chemistry and catalysis; colloids (sedimentation, osmotic pressure, emulsions, etc.). Laboratory experiments on a selection of these topics.

**CH-307**

**Laboratory Techniques**

Theoretical and practical glass-blowing techniques; repair of chemical glassware and construction of simple apparatus. Design and fabrication of apparatus for chemical laboratory use; consideration of problem, choice of materials, design of fittings, vacuum techniques, etc.

**CH-402**

**Statistics and Quality Control**

Frequency distribution; measures of location; measures of dispersion; permutation, combination, and probability; samples and accuracy of the mean; binomial; poisson and normal distribution; regression; quality control with the interpretation of quality control charts.

**CH-408**

**Industrial Relations**

Human relations and its effects on morale and work production; leader defined and examined; selecting, inducting, training and promoting employees; creating favourable work conditions (physical plant); accident prevention; merit rating; labor relations; case studies of actual industrial problems and difficult situations; public relations of the chemical business as an industry in the community.

**CH-409**

**Industrial Chemistry**

Raw material requirements, production and chemical control methods in Canadian industries, petroleum, rubber and plastics; paints; lacquers and protective coatings; fertilizers; pulp and paper; food products; pharmaceuticals; industrial electrochemistry; organic and inorganic chemicals; process problems and calculations; industrial hazards and practices; etc.

**CH-410**

**Chemical Projects**

A project is required to be satisfactorily completed by all graduating students. This project is to include:

(a) literature search and feasibility,
(b) practical laboratory work,
(c) written report.
Civil Technology

Entrance Requirements:

1. Grade XII standing (Vocational Industrial, General or University Entrance Course) with demonstrated proficiency in English, Mathematics and Physical Science (i.e. chemistry and physics).

2. Junior Matriculation or its equivalent if secured prior to December 31, 1963. (Another option is acceptable in place of a second language).

Length of Course:

TWO SCHOOL YEARS, each of ten months duration, leads to a Diploma in Technology (Dipl. T.). Each of the ten month periods is divided into two equal terms with final term examinations written at the end of each term. Classes commence in September of each year.

Fees and Expenses:

The tuition fee for the course in Civil Technology is $100.00 for each of the four terms. Other expenses include textbooks, incidentals, board and lodging.

Employment Possibilities:

As a technician, the graduate in Civil Technology holds a key between the engineer and the tradesman, between theory and construction. He is trained to adapt engineering theory to construction and trades techniques. His work is often described as developmental, covering the stages between engineering concepts and physically complete projects.

Either option of the program provides the graduate with a great variety of job possibilities in the civil field. These include positions as technicians in drafting and design, as construction supervisors, as inspectors, as estimators, as material testers, as members of surveying teams, etc. Consulting engineers, municipalities, construction firms, highways departments, railways, offer many of the employment avenues open. The graduate may well find an interesting career in the sales and management field of the building materials or heavy equipment industries.
# COURSE OUTLINE

## First Year

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<td>C-205</td>
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<tr>
<td>C-206</td>
<td>Specifications &amp; Reports</td>
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</tr>
<tr>
<td>C-209</td>
<td>Mathematics</td>
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## Second Year

### STRUCTURAL OPTION

#### TERM 3

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<td>C-407</td>
<td>Timber Design</td>
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<tr>
<td>C-410</td>
<td>Design of Foundations</td>
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<tr>
<td>C-413</td>
<td>Job Control &amp; Costing</td>
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HIGHEST MUNICIPAL OPTION

COURSE DESCRIPTIONS

C-101 Construction Materials

Portland cement concrete: manufacture of cement; properties of aggregates, manufacture and properties of Portland cement; design of concrete mixes; testing of concrete mixes.

Asphalt: manufacture of asphalt cement; design of asphalt mixes; properties of bituminous concrete.

Steel: manufacture and properties of structural steel, types of structural steel; effects of elements on properties of steel.

Aluminum: manufacture of aluminum; types of aluminum alloys; properties of aluminum.

Timber: production, species and grading of lumber; protective treatments.

C-102 Mechanics

The basic concepts of statics and dynamics as applied in the analysis of structures. Forces, moments, free body diagrams, trusses, frames, friction, free falling bodies, motion of projectiles, work, energy and power.

C-103 Surveying

Measuring distance by various methods with emphasis on steel tapes and corrections to taping. Use and adjustment of the engineer’s transit and level. Differential and reciprocal leveling. Methods of surveying open and closed traverses and calculation of areas. Curvature and refraction. Error theory and precision related to survey measurements. Determination of missing data in closed traverses. Procedures and calculation to determine azimuths from observations on polaris and the sun.
C-106 Drafting
Principles of engineering drawing based on Canadian standards; lettering, scaling, dimensioning, instruments and their use, geometric drawing, orthographic projections, auxiliary views, sectioning, isometric drawing; blueprint reading; descriptive geometry; special projects involving inking.

C-109 Mathematics
Algebra; Numerical computation, laws of exponents, radicals, significant figures, simple algebraic operations, quadratic equations, simultaneous equations; functions and their graphs, factoring, complex fractions, common and natural logarithms, interpretation, determinants, remainders and factor theorems, synthetic division vectors. Use of slide rule.

Trigonometry: Trigonometric functions, interpolation and logarithms, solution of right triangles, area of right triangles, graphing by composition of ordinates, fundamental relations of trigonometry, inverse trigonometric functions, oblique triangles, straight lines and circles, theory of equations.

C-110 English
Origin and growth of the English language; standards of modern English; words — dictionary; spelling; punctuation; basic grammar; sentence structure; basic sentence faults; effective paragraphs; essay writing, oral communication.

PE-101
& PE-201 Physical Education
The Physical Education program provides students with the opportunity to maintain a high level of physical fitness and to gain knowledge and experience in a wide variety of individual, dual and team sports.

C-202 Mechanics
Continuation of Mechanics C-102 dealing with centroids, centres of gravity, moments of inertia, fluid statics and the practical application of statics.

C-203 Surveying

C-205 Strength of Materials
Elastic theory, stress, strain and elastic moduli, Poisson's ratio, bolted and welded joints, the torsion equation applied to circular sections; shear force and bending moment diagrams; the bending equation; bending stress, shear equation and shear stress; combined stress systems; principal stresses; Mohr's stress circle; the three moment equation for continuous beams.

C-206 Specifications and Reports
Writing of letters, interdepartmental memorandums and reports. Interpretation of specifications as applied to Civil Technology and the preparing and writing of said specifications.

Standard forms; requisitions, work orders, change orders, purchase orders, etc.

C-209 Mathematics
Review of circles and loci; polar and rectangular co-ordinates, conics, ellipse and parabola, translation of axis, solid analytical geometry. Calculus — meaning of variables, constants, functions, theorems on limits maxima and minima, continuous and discontinuous functions, delta process — slope relationship, differentiation of simple functions. Introduction to integral calculus.

C-211 Drafting
Drawing of structural steel frameworks and connections; reinforced concrete principles and drawing of structural concrete details; structural drafting including laminated construction, drawing of municipal structures using a sewer and water system.
C-305 Strength of Materials
Deflection of simply supported overhanging and fixed-end beams by the beam diagram method, area-moment, and the conjugate beam method, stresses in eccentrically loaded members. Eccentrically loaded connections. Eccentric thrust. Basic graphical statics. This course includes the appropriate laboratory work.

C-306 Reinforced Concrete Design
General properties of reinforced concrete; basic design theory; design and review of simple beams and slabs; design and review of simple beams reinforced for compression; design and review of simple T-beams; design of continuous slabs; design of columns; miscellaneous topics.

C-307 Structural Steel Design
Design of the individual components of buildings based on CSA Standard S16, 1965 using the C.I.S.C. handbooks; design of rolled tension members, built up tension members and sag rods; built up columns, three plate welded columns, lacing and tie plates, column base plates and columns subject to combined axial and bending stress; simple beams, continuous beams, plate girders, lintels and beams subject to biaxial loading; bolted and welded building connections.

C-308 Theory of Structures
Types of structures; line diagrams; classification of loads; reactions of structural frames; statically determinate structures; reactions for cantilever and arch type construction; shear and moment diagrams; moments and shears; subdivided trusses; influence lines for beams; influence lines for trusses; moving loads for highway and railway bridges; approximate analyses of indeterminate structures; deflections by elastic weight and conjugate beam methods; deflection of trusses by virtual work; the Williot Mohr diagram.

C-309 Mathematics
Review of differential calculus, integral calculus; and functions used in mathematical statement. Problems in arc length, areas, volumes, centroids, work, liquid pressure and moments of inertia. Introduce statistics, histogram, mean, standard deviation, selection, internal arrangement, Binomial distribution, Poisson distribution, Normal distribution. Problems in arrangement and distribution. Use of 5% limit to reject long odds.

C-406 Reinforced Concrete Design
Detailing and scheduling practice; design and strap; simple and cantilever footings; retaining walls; design of columns for eccentric loads; design of continuous T-Beams; ultimate strength design for simple doubly reinforced rectangular and T-beams; principles of prestressed concrete design.

C-407 Timber Design
Design of the individual components of buildings based on CSA Standard 086 using the C.I.T.C. handbooks. Design of sawn lumber beams, glulam beams, joist, rafters and decking; design of simple sawn columns, simple glulam columns, spaced columns and columns subject to combined axial and bending stress; design of timber fastenings including nails, lag screws, bolts and timber connectors; plywood design including stressed skin panels, stiffened panels and plywood beams.

C-410 Design of Foundations
Site investigation; types of foundations, lateral pressures; sheet piling; cofferdam design.

C-413 Job Control and Costing
Critical path method of planning and scheduling; network theory; project scheduling; advanced network techniques; resource allocation; visual presentation; project analysis; analysis of Critical Path reports; finance as related to the Critical Path; Applied industrial psychology.
C-414 Bridge Design

Bridge design consideration as based on A.A.S.H.O. specifications; hydrology, hydraulics and soil considerations; culvert design, selection and installation; design of a treated timber bridge, reinforced concrete bridge; bridge surveys and inspection correlated with the design, detailing and drawing of plans for a complete timber bridge.

C-415 Soil Mechanics


C-422 Design of Structures

Deflection methods of analyzing indeterminate beams and trusses; the moment distribution method of analysis of continuous beams and frames; wind load analysis; wind bracing of buildings; study of structural combinations including steel joists; steel frame, precast concrete, reinforced concrete and timber constructions; design and drawings for a warehouse; design of rigid frames.

HIGHWAY — MUNICIPAL OPTION

C-309 Mathematics

Review of differential calculus, integral calculus; and functions used in mathematical statement. Problems in arc length, areas, volumes, centroids, work, liquid pressure and moments of inertia.

Introduce statistics, histogram, mean, standard deviation, selection, internal arrangement, Binomial distribution, Poisson distribution, Normal distribution. Problems in arrangement and distribution. Use of 5% limit to reject long odds.

C-312 Hydraulics

Hydrostatics including intensity of pressure, manometers, pressure heads, and measuring of pressure. Closed Conduit Flow including Bernoulli’s Equation, Continuity and Momentum Equations; flow measurements with orifices, weirs, Jutot tubes and Venturi meters, pipe, pump and reservoir problems. Open channel flow including types, Manning Equation, Froude Numbers, specific head diagrams, and their use in solving problems in open channels.

C-316 Photogrammetry


C-317 Soil Mechanics


C-318 Pavement Mix Design


C-320 Structural Design

Steel — Design of tension and compression members; beams; columns; welded and bolted connections.

Timber — Design of beams and columns using sawn timber and glulams; connections using bolts and timber connectors; timber decking; plywood.

Concrete — Basic reinforced concrete design theory; design and review of simple beams and slabs; design of columns; reinforcing steel scheduling.

C-413 Job Control and Costing

Critical path method of planning and scheduling; network theory; project scheduling; advanced network techniques; resource allocation; visual presentation; project analysis; analysis of Critical Path reports; finance as related to the Critical Path. Applied industrial psychology.

C-419 Practical Geology

Mineral and rock identification, processes of rock weathering; foundation grouting including types, materials used, equipment, systems and methods employed. Permafrost as applied to northern road construction. Oral presentations by students on selected topics from instructor.

C-421 Street and Highway Design


C-423 Water Supply and Waste Disposal


C-424 Hydrology

Collection and presentation of precipitation data; collection and presentation of runoff data; measuring discharge, stream gaging and graphical presentation of presenting runoff data. Peak discharge and flood runoff and forecasting with emphasis on unit hydrograph and Shydrograph. Flood routing through reservoirs, retarding basins and flood forecasting.

C-425 Stabilization

Mechanical Stabilization — description, suitable soils, mixing, compacting.

 Mechanical Stabilization with commercial stabilizing agents — Stabilization with lime; description and use, suitable soils, types of lime, lime content, strength requirements, construction procedures. Stabilization with Portland cement; types of cement treatment, cement content, construction procedures. Suitability of combination of lime and cement. Stabilization with bitumen; types, uses, suitable soils, types of bitumens, bitumen content, strength, moisture content, construction procedures. Various other chemical stabilizers.
Drafting Technology

Entrance Requirements:

1. Grade XII standing (Vocational Industrial, General or University Entrance Course with demonstrated proficiency in English, Mathematics and Physical Science (i.e. chemistry and physics).

2. Junior Matriculation or its equivalent if secured prior to December 31, 1963. (Another option is acceptable in place of a second language).

Length of Course:

TWO SCHOOL YEARS, each of ten months duration, leads to a Diploma in Technology (Dipl. T.). Each of the ten month periods is divided into two equal terms, with final term examinations written at the end of each term. Classes commence in September of each year.

Fees and Expenses:

The tuition fee for the course in Drafting Technology is $100.00 for each of the four terms. Other expenses include textbooks, incidentals, board and lodging.

Employment Possibilities:

The rapid absorption of new scientific knowledge into the engineering sciences coupled with the advances in automation and computer control of production processes has increased the need for clear and concise presentation of technical information. The need for the preparation of engineering drawings to convey this information has not diminished and more drawings are required today than ever before. The future appears bright for the young person who chooses Drafting Technology as their career.

A great variety of job opportunities await the graduate in Drafting Technology. Positions are available in architectural offices, consulting engineers, structural and fabricating offices, manufacturing, construction, service industry, tool design, civic, provincial and federal government departments.
# COURSE OUTLINE

## First Year

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<th>Course No.</th>
<th>Course</th>
<th>HOURS per WEEK</th>
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<tr>
<td>D-102</td>
<td>Mathematics</td>
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<tr>
<td>D-103</td>
<td>Physics</td>
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<td>Applied Mechanics</td>
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<tr>
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<td>Basic Drafting</td>
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<td>Machine Drawing</td>
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<td>D-207</td>
<td>Descriptive Geometry</td>
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<tr>
<td>D-208</td>
<td>Strength of Materials (Principles)</td>
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## Architectural Option

### Second Year

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<tr>
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<tr>
<td>D-305</td>
<td>Detail Drafting</td>
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<tr>
<td>D-308</td>
<td>Strength of Materials</td>
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<tr>
<td>D-310</td>
<td>History of Architecture</td>
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<td>D-311</td>
<td>Building Construction</td>
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<td>Theory of Systems</td>
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<tr>
<td>D-410</td>
<td>History of Architecture</td>
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<td>D-412</td>
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ENGINEERING OPTION

TERM 3

Course No. | COURSE                     | HOURS per WEEK
           |                           | Lect. | Lab.
D-308     | Strength of Materials     | 2     | 1
D-320     | Industrial Practices      | 3     | 0
D-321     | Mechanical Drafting       | 0     | 12
D-322     | Materials & Specifications| 4     | 0
D-323     | Tool & Die Design         | 1     | 3
D-324     | Structural Drafting       | 0     | 4

TERM 4

Course No. | COURSE                     | HOURS per WEEK
           |                           | Lect. | Lab.
D-408     | Strength of Materials     | 2     | 2
D-420     | Industrial Practices      | 3     | 0
D-421     | Mechanical Drafting       | 0     | 16
D-422     | Materials & Specifications| 3     | 0
D-423     | Tool & Die Design         | 0     | 4

10          | 20

COURSE DESCRIPTIONS

G-101 English
Use of the dictionary; sentence structure, punctuation; note-taking; writing precis and paraphrases; essays.

G-102 Mathematics
Numbers and their significance in making computations with measured values; powers of numbers, logarithms and the slide rule; trigonometry; vectors; complex numbers.

D-103 Physics

D-104 Applied Mechanics
Basic concepts of statics as applied in the analysis of structures. Forces, moments, free body diagrams, trusses, frames and friction. Centroids and moment of inertia of areas.

D-105 Basic Drafting Techniques
Principles of engineering drawing based on Canadian Standards Association Series in the field of drawing practice; instruments and their use; applied geometry; lettering, orthographic drawing and sketching; pictorial drawing and sketching; auxiliaries; normal and edge views; sections and conventions; dimensions, notes, limits, and precision; screw threads, fasteners, keys, rivets, and springs; working drawings; assigned projects.

D-106 Machine Drawing
Drafting standards for detail drawings; technical information related to machine drawing; drafting standards for assembly drawings.

PE-101 & PE-201 Physical Education
The physical education program provides students with the opportunity to maintain a high level of physical fitness and to gain knowledge and experience in a wide variety of individual, dual, and team sports.
G-201 English
Technical writing; business letters; the library and literature searching; technical reports; technical and semi-technical publications.

D-202 Mathematics
Algebra, algebraic and trigonometric equations; curve plotting; conic sections; differentiation and integration.

D-203 Physics

D-205 Technical Drafting
Drawings of welded parts; drawing of steel, reinforced concrete and timber structures; architectural drafting; surface developments and intersections; maps and topographic drawing; individual and class projects.

D-207 Descriptive Geometry
An analysis of space relationships, a three-dimensional problem is solved by successive two-dimensional views. Orthographic projection, auxiliary-views, lines as a point, plane as an edge, true lengths and angles, shortest distances. Revolution, curved lines and surfaces. Intersections. Problem.

D-208 Strength of Materials
Stress, strain and elastic moduli, Poisson’s ratio. Bolted and welded joints, Torsion equation applied to circular sections; shear force and bending moments, shear force and bending moment diagrams; the bending equation stress due to bending; stress due to shear; combined stresses, principal-stresses; Mohr’s circle.

ARCHITECTURAL OPTION

D-305 & D-405 Detail Drafting
Study of styles and techniques for advanced architectural working drawings; technical drawings that provide graphic description of basic building design, graphic presentation and practical application of building construction and strength of material principles; renovation and surveying of existing buildings.

D-308 & D-408 Strength of Materials
Deflection of simply supported overhanging and fixed-end beams by the beam diagram method, area-moment, and the conjugate beam method. Stresses in eccentically loaded members. Eccentrically loaded connections. Eccentric thrust. Basic graphical statics. This course includes the appropriate laboratory work.

D-310 & D-410 History of Architecture
Ideals, history and achievements of modern architecture; space and construction concepts; functionalists of Europe, Chicago School in American; Le Corbusier; Frank Lloyd Wright up to contemporary.

D-311 & D-411 Building Construction
Basic materials and methods of construction; qualitative aspects of structural design; code engineering; cost estimates; foundations, structural members and masonry construction; wood, steel and cast in place, concrete construction; wall sections; precast and prestressed concrete.
D-312 & D-412 Theory of Systems
Basic principles of architectural structures; loads on structures; structural requirements; heating and air conditioning; plumbing and sprinkler systems; electric power and lighting; vertical transportation.

D-308 & D-408 Strength of Materials
Deflection of simply supported overhanging and fixed-end beams by the beam diagram method, area-moment, and the conjugate beam method. Stresses in eccentrically loaded members. Eccentrically loaded connections. Eccentric thrust. Basic graphical statics. This course includes the appropriate laboratory work.

D-320 Industrial Practices
Introduction to steel metallurgy and heat treating practice followed by a study of welding technology. Topics include: welding process, electrodes, weldability of metals, joint design, weld symbols, inspection and testing of welded joints, brazing, soldering, flame cutting, codes and standards, welding economics.

D-321 & D-421 Mechanical Drafting
Advanced work in projection drawing including material take-offs in developments, tolerancing, screw threads, fasteners, bearings, keys, springs, gearing and cams, mechanical drives, pumps, fans, plate work and sheet metal detailing, fluid mechanics, pneumatics and hydraulic systems, piping symbols and drawings, pressure vessels, drawing reproduction, systems, industrial electrical drawings.

D-322 & D-422 Materials & Specifications
A detailed study of the physical and chemical properties of the commonly used engineering materials including steels, non-ferrous metals, concrete, timber, plastics, adhesives, building materials, etc. The following topics will be covered: engineering approach to material selection; material standards; specifications and codes; standardizing bodies and their jurisdiction; material testing and inspection; use of handbooks and catalogues; standard methods for specifying material; commercial sources of supply including stock sizes and grades; techniques of material estimating; quantity surveying; material specifications and contracts.

D-313 Architectural Practice
Architectural office procedure; sequence of production of working drawings; specification and tendering; job site supervision; scheduling and supervision of construction projects.

ENGINEERING OPTION

D-323 Tool and Die Design
Introduction to modern machine tools and their ranges and applications. Topics include: turning and boring, drilling, broaching, shaping, milling, planing, grinding, sawing, threading, shop nomenclature, setup procedures, surface finishes, shop procedures.

D-324 Structural Drafting
Introduction to drawing office procedures in the structural steel industry. Subjects to include: structural steel and its fabrication, material nomenclature, beams, standard connections, column details, truss work detailing, riveted joints, welded connections, reinforcing steel, material take-offs.

D-420 Industrial Practices
A study of the basic manufacturing processes including the machines and methods used: moulding and casting, die casting, hot and cold forming, extruding, forging, stamping, coating and finishing.

D-423 Tool and Die Design
Study of tool and die design as related to manufacturing methods. Subjects include: fundamentals of metal cutting tools, standard tooling components, and accessories, pressing and breaking dies, drill jigs, punches, gauges, gauge blocks, work measurement.
Electrical Technology

Entrance Requirements:

1. Grade XII standing (Vocational Industrial, General or University Entrance Course) with demonstrated proficiency in English, Mathematics and Physical Science (i.e. chemistry and physics).

2. Junior Matriculation or its equivalent if secured prior to December 31, 1963. (Another option is acceptable in place of a second language).

Length of Course:

TWO SCHOOL YEARS, each of ten months duration, leads to a Diploma in Technology (Dipl. T.). Each of the ten month periods is divided into two equal terms with final term examinations written at the end of each term. Classes commence in September of each year.

Fees and Expenses:

The tuition fee for the course in Electrical Technology is $100.00 for each of the four terms. Other expenses include textbooks, incidentals, board and lodging.

Employment Possibilities:

The graduate occupies a key and unique spot between the engineer and craftsman. Trained to adapt engineering theory to industrial practice, he is limited only by his personal horizon. Consulting engineers, manufacturers, power companies, government agencies, contractors and distributors are some of the groups offering employment in this dynamic and challenging field.
**COURSE OUTLINE**

**First Year**

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<thead>
<tr>
<th>Course No.</th>
<th>Course</th>
<th>Term 1</th>
<th>Term 2</th>
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<td>G-102</td>
<td>Mathematics</td>
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<tr>
<td>G-103</td>
<td>Physics</td>
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<tr>
<td>G-104</td>
<td>Engineering Drawing</td>
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<tr>
<td>E-102</td>
<td>Electrical Fundamentals</td>
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<tr>
<td>E-103</td>
<td>Basic Electrical Instruments</td>
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<tr>
<td>E-104</td>
<td>Electrical Practices &amp; Design</td>
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<td>PE-101</td>
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**Second Year**

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<tr>
<td>G-302</td>
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<td>E-304</td>
<td>Electrical Circuits</td>
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<td>E-305</td>
<td>Electrical Machines</td>
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<tr>
<td>E-306</td>
<td>Control Systems</td>
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<tr>
<td>E-308</td>
<td>Electronics</td>
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<td>E-309</td>
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<td>E-313</td>
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<td>E-314</td>
<td>Illumination System Design</td>
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COURSE DESCRIPTIONS

G-101 English
Use of the dictionary; sentence structure, punctuation; note-taking; writing precis and paraphrases; essays.

G-102 Mathematics
Numbers and their significance in making computations with measured values; powers of numbers, logarithms and the slide rule; trigonometry; vectors; complex numbers.

G-103 Physics
Statics; kinematics; dynamics; energy; rotary motion; temperature; thermal expansion; radiation; conduction and convection; elementary principles of sound.

G-104 Engineering Drawing
Principles of engineering drawing based on Canadian standards; lettering; instruments and their uses; orthographic projection.

E-102 Electrical Fundamentals
Systems of units; charge, current, voltage, power and energy; electric and magnetic fields; Coulomb's Law; capacitive, inductive and resistive effects; Ohm's Law, Kirchhoff's Laws, frequency, impedance; complex quantities; resonance.

E-103 Basic Electrical Instruments
Principle of the D'Arsonval movement; adapting the basic moving coil instrument to measurement of voltage, current and resistance; combination instruments — the multimeter; clip-on ammeters; the Wheatstone bridge; the Kelvin double bridge; the potentiometer; the megger; the single phase wattmeter.

E-104 Electrical Practices and Design
Underwriters, CSA, and Canadian Electric Code; resistance and wire tables; basic circuits and devices; overcurrent devices; conductor selection; grounding; wiring methods and materials; motor conductor sizing and control.
PE-201
& PE-201 Physical Education

The physical education program provides students with the opportunity to maintain a high level of physical fitness and to gain knowledge and experience in a wide variety of individual, dual, and team sports.

G-201 English

Technical writing; business letters; the library and literature searching; technical reports; technical and semi-technical publications.

G-202 Mathematics

Algebra, algebraic and trigonometric equations; curve plotting; conic sections; differentiation and integration.

G-203 Chemical Physics

Basic chemical principles

Matter—atomic structure; atomic numbers; isotopes; electrical nature of matter; electrochemical action; electro-plating; corrosion; bonding; band theory; solid state; x-rays; photo-electric effect; nuclear structure.

G-204 Engineering Drawing

Pictorial representation; orthographic projections; sectional views; auxiliary views; isometric and other forms of pictorial drawings; dimensioning; special projects.

E-202 Electrical Fundamentals

Polyphase systems; measurement of three-phase power; power systems; transformers and their use in single and three phase systems.

E-203 Basic Electrical Instruments

Magnetic effects of electric current; flux density; systems of units; force on a current carrying conductor in a magnetic field; the Hall effect; the Hall effect Gauss meter; magnetic circuits; magnetization curves; magnetic circuits with D.C. excitation; magnetic circuits with A.C. excitation; self-inductance; current buildup in a R-L circuit; the Cathode-ray oscilloscope; impedance bridges; Q meter; recorders; self-balancing potentiometer recorder; measuring power in three phase circuits.

E-204 Electrical Practice and Design

Electrical design and layouts; wiring in hazardous locations; electrical heating; auxiliary systems; main distribution design.

G-302 Mathematics

Differential and Integral Calculus; rates of change; maxima and minima; curve tracing; arc lengths; areas; volumes; centroids; moments of inertia.

E-304 Electrical Circuits

Matrix methods of analysis; development of the circuit concept; equivalent sources; source transformations; transients in simple networks; application of the Laplace transform method to the solution of network problems; coupled circuits.

E-305 Electrical Machines

D.C. generators; D-C motors; 3-phase induction motors; synchronous machines.

E-306 Control Systems

Measurement and control — primary sensing devices; modes of control; proportional, reset and rate; control combinations; digital logic and static control.

Binary numbering system; logical algebra; logic operations; AND, OR, NOT, NAND, NOR; truth tables; static control system examples.

Analogue computers — analogue simulation; summators; integrators; hardware mechanization; initial conditions; amplitude scaling; time.

Computers in Control Systems — concept of a digital computer; characteristics of a real-time sys-
tem; input/output interfacing of control and recording devices; A-D and D-A conversion; process control by a real-time computer.

E-308 Electronics
Vacuum and gas-filled tubes; amplifiers; power supplies — rectifiers, and filters; A.C. circuits for electronics; solid-state devices — diodes; tunnel diodes, zener diodes, SCR'S, SCS'S, etc.

E-309 Electrical Drafting
CSA, IEEE, etc., symbols; electrical layouts; drawing projects; CPM.

E-313 Electrical Measurements
Wave forms and AC meters — periodic wave-forms; form factor; rectifier instruments; thermocouple instruments; electrostatic voltmeter;
Power and Energy — Hall effect wattmeter; Thermal converter; polyphase power measurements; power factor meters; Fourier Analysis — Fourier Series; RMS value in terms of Fourier components.
Transformer concepts — equivalent circuits; polarity testing; exciting and inrush current; harmonics in three phase banks; parallel operation of transformers; auto transformers.
Instrument transformers — current transformers; potential transformers; standard burdens; accuracy classes; effect of C.T.'s and P.T.'s on metering.

E-314 Illumination System Design
Introduction — light sources; candle power; level of illumination; brightness, etc., illumination measurements; types of lamps and their characteristics; design of lighting layouts; cost analysis.

G-402 Mathematics
Elementary differential equations; Boolean algebra; analogue and computer operations.

G-407 Economics
Depreciation; overhead; cost of material; labour and expenses; financial statements; production economics.

E-405 Electrical Machines
Single phase induction motors; fractional horsepower motors of various types; printed-circuit motors; electronic machine control.

E-406 Control Systems
Equations of physical systems; mechanism components; transfer functions; performance evaluation.

E-408 Electronics
Solid state devices continued from E-308; photodiodes, phototransistors, photo transistors; Hall devices; transistors; AM and FM modulation; telemetry principles; transistor circuitry—amplifiers, oscillators, regulators, switching and logic circuits, etc.

E-413 Electrical Measurements
Transmission line topics; analog telemetry systems; digital telemetry systems; power system grounding considerations; ground resistance measurements.

E-414 Switch Gear and Protection
Various types of switches; various types of relays; various types of circuit breakers; fault current calculations; protective devices.

E-415 Specifications
Construction contracts; bidding procedures; specifications writing; CSA, CEMA and Canadian Government specifications; catalogue specifications.

E-416 Digital Computer Programming — Computing Fundamentals
FORTRAN programming, selected mathematical topics — Matrix Methods; numerical analysis, etc.
Electronic Technology

Entrance Requirements:

1. Grade XII standing (Vocational Industrial, General or University Entrance Course with demonstrated proficiency in English, Mathematics and Physical Science (i.e. chemistry and physics).

2. Junior Matriculation or its equivalent if secured prior to December 31, 1963. (Another option is acceptable in place of a second language).

Length of Course:

TWO SCHOOL YEARS, each of ten months duration, leads to a Diploma in Technology (Dipl. T.). Each of the ten month periods is divided into two equal terms, with final term examinations written at the end of each term. Classes commence in September of each year.

Fees and Expenses:

The tuition fee for the course in Electronics Technology is $100.00 for each of the four terms. Other expenses include textbooks, incidentals, board and lodging.

Employment Possibilities:

The studious Electronics Technician is limited only by his personal horizon. There is a place in research and development with government agencies and industrial laboratories, in installation and maintenance with communications organizations, in design, in development and production with manufacturers, in technical sales and marketing with industrial distributing firms — there is, in fact, a place for the well qualified technician wherever electronics equipment is utilized.
### COURSE OUTLINE

**First Year**

<table>
<thead>
<tr>
<th>Course No.</th>
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<th>HOURS per WEEK</th>
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### TERM 2

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### Second Year

### TERM 3

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<td>Specifications</td>
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<td>Electronic Measurements</td>
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NOTE:

Term IV offers two separate options. At the termination of Term III, and with the guidance of the school authorities, the student will decide which of the two he will follow as his specialty. The two options are: Switching Circuits and Communication Theory. Six courses are common to each option, with all other courses different and arranged to provide the best possible training for either specialty.

<table>
<thead>
<tr>
<th>Course No.</th>
<th>COURSE</th>
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<th>Lect.</th>
<th>Lab.</th>
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TERM 4

COMMUNICATION THEORY

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</table>


G-101 English
Use of the dictionary; sentence structure; punctuation; notetaking; writing precis and paraphrases; essays.

G-102 Mathematics
Numbers and their significance in making computations with measured values; powers of numbers, logarithms and the slide rule; trigonometry; vectors; complex numbers.

G-103 Physics
Statics; kinematics; dynamics; energy; rotary motion; temperature; thermal expansion; radiation; conduction and convection; elementary principles of sound.

G-104 Engineering Drawing
Principles of engineering drawing based on Canadian standards, lettering; instruments and their uses; orthographic projection.

EL-102 Electronic Fundamentals
Systems of units; charge, current, voltage; power and energy; Ohm's Law, Kirchoff's Laws and network theorems; electric and magnetic fields; capacitive, inductive and resistive effects.

EL-103 Basic Electrical Instruments
Magnetism and magnetic circuits; induced electromotive force; D'Arsonval movement and galvanometers; Faraday's Law, Lenz's Law; voltmeter; ohmmeter; ammeter; Wheatstone Bridge, Kelvin double bridge; potentiometer; megger.

EL-105 Electronic Techniques
Use of hand tools; soldering; color codes; operation of test equipment; tube manual outline; experiments in tube theory; construction of power supply and audio amplifier units.

PE-101 & PE-201 Physical Education
The Physical Education program provides students with the opportunity to maintain a high level of physical fitness and to gain knowledge and experience in a wide variety of individual, dual, and team sports.

G-201 English
Technical writing; business letters; the library and literature searching; technical reports; technical and semi-technical publications.

G-202 Mathematics
Algebra, algebraic and trigonometric equations; curve plotting; conic sections; differentiation and integration.

G-203 Chemical Physics
Basic chemical principles.
Matter—atomic structure, atomic numbers, isotopes; electrical nature of matter; electro-chemical action; electro-plating; corrosion; bonding; band theory; solid state; x-rays; photo-electric effect; nuclear structure.

G-204 Engineering Drawing
Graphic symbols, size and proportions; block diagrams; signal flow; schematic elements; layout procedures; components and assemblies; complete schematic diagram interpretation with fully complicated schematic. Drawing a schematic diagram from an operational sub-assembly.

EL-202 Electronic Fundamentals
A.C. currents and voltages; impedance; resonance; transformers; vacuum tubes and semi-conductors; equivalent circuits; amplifiers.

EL-203 Basic Electronic Instruments
Moving iron vane movement; electro dynamometer movement; standard cells; copper oxide rectifier meter; statistical analysis; cathode ray oscilloscope; electron ballistics; magnetostatics; A.C. impedance bridges; wattmeters; power factor meter; frequency meter; phase sequence indicator.
EL-205 Electronic Techniques
Philco trainer equipment is used to illustrate bracing, signal input and output, effects with both voltage and power amplifier; load line principles with operating circuitry; complete superheterodyne principles regarding operational theory; fault finding principles by signal injection and applied faults.

G-302 Mathematics
Differential and integral calculus; rates of change; maxima and minima; curve tracing, arc lengths; areas; volumes; centroids; moments of inertia.

G-306 Specifications
Preparation and interpretation of specifications; standards CSA, IRE, IEEE, etc.

EL-303 Electronic Circuits
Kirchhoff’s Laws; loop and nodal analysis; circuit response in determinantal forms; circuits of electronic devices such as amplifiers and oscillators.

EL-304 Electronic Devices
Semi-conductor amplifiers; cascaded R.C. coupled amplifiers; pulse amplifiers; temperature compensation for transistor amplifiers; D.C. amplifiers; large signal amplifiers.

EL-306 Electronic Measurements
Electronic measuring instruments; AF, RF, and UHF measuring techniques.

EL-307 Control Systems
Equations of physical systems; hydraulic, mechanical and electrical, components of physical systems; transfer functions. (Emphasis on the electronic implications).

EL-312 & EL-412
Electromechanical Devices
Synchronous machines; induction motors; transducers; synchros.

EL-402 Mathematics
Elementary differential equations; Boolean algebra; analogue and digital computer operations.

G-407 Economics
Depreciation; overhead; cost of materials; labour and expenses; financial statements; production economics.

EL-403 Electronic Circuits and Fields
Transmission lines; parameters and equations; high frequency applications of transmission lines; guided electromagnetic waves; selected types in microwave antennae and propagation.

EL-404 Electronic Devices
Pulse circuits; oscillators; modulation and demodulation processes; microwave devices.

EL-407 Control Systems
Performance evaluation of proportional error, derivative and integral control systems; figures of merit, use of recorders, etc.

EL-408 Electronic Projects
A project is required to be satisfactorily completed by all graduating students. This project is to include: (a) preliminary investigation, (b) practical work, (c) written report.

EL-409 Pulse, Digital and Logic Circuits
Linear waveshaping of RLC networks; switching characteristics of devices; clipping, clamping and comparator circuits; multivibrators; sampling gates; counting and timing.

EL-410 Computer Programming
Introduction to the computer language, but special emphasis on FORTRAN programming and the solution of engineering problems.

EL-411 Communication Theory
Analysis of receivers and transmitters; single sideband; telemetry, radar and microwave communication systems; problems in impedance matching, feed systems, filter networks, antenna arrays and field patterns.
Instrumentation Technology

Entrance Requirements:

1. Grade XII standing (Vocational Industrial, General or University Entrance Course with demonstrated proficiency in English, Mathematics and Physical Science (i.e. chemistry and physics).

2. Junior Matriculation or its equivalent if secured prior to December 31, 1963. (Another option is acceptable in place of a second language).

Length of Course:

TWO SCHOOL YEARS, each of ten months duration, leads to a Diploma in Technology (Dipl. T.). Each of the ten month periods is divided into two equal terms, with final term examinations written at the end of each term. Classes commence in September of each year.

Fees and Expenses:

The tuition fee for the course in Instrumental Technology is $100.00 for each of the four terms. Other expenses include textbooks, incidentals, board and lodging.

Employment Possibilities:

There are two main fields of employment. One is with firms who design, manufacture and sell engineering, laboratory, scientific and optical instruments; the other is in industries such as the chemical, petroleum refining, papermaking, electrical utility, atomic research and the air transport fields. Smaller numbers of technicians are in meteorology, geophysics and similar scientific fields.

Occupations in instrumentation are still emerging and there is considerable overlap between instrumentation, mechanical, chemical and electrical technicians. Consequently, duties will vary from industry to industry, and from company to company within the same industry. In general, technicians develop, install, calibrate, trouble-shoot and repair instruments and control systems.
# COURSE OUTLINE

## First Year

<table>
<thead>
<tr>
<th>Course No.</th>
<th>COURSE</th>
<th>TERM 1</th>
<th>HOURS per WEEK</th>
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## Second Year

## TERM 3

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COURSE DESCRIPTIONS

G-101 English
Use of the dictionary; sentence structure; punctuation; note-taking; writing precis and paraphrases; essays.

G-102 Mathematics
Numbers and their significance in making computations with measured values; errors; powers of numbers; logarithms and the slide rule; trigonometry; vectors; complex numbers.

G-106 Physics
Basic mechanics; kinematics; dynamics and energy. Temperature measurement, thermal expansion; radiation; conduction and convection. Elementary principles of light and sound.

E-102 Electrical Fundamentals
Systems of units, charge; current; voltage; power; energy; electric and magnetic fields; Coulomb's Law; capacitive, inductive and resistive effects; Ohm's Law; Kirchhoff's Law; frequency; impedance; complex quantities; resonance.

E-103 Basic Electrical Instruments
Underwriters, CSA, and Canadian Electrical Code; resistance and wire tables; basic circuits and devices; overcurrent devices; conductor selection; grounding; wiring methods; motor conductor sizing and control; electrical drafting.

I-101 Fundamentals of Instrumentation
Art and science of measurements; units and dimensional analysis; basic concepts of pressure measurement; manometer; Reynold’s number; Bernoulli’s Equation; flow losses in piping systems; liquid and gas flow measurement; liquid level measurements; temperature measurements; humidity measurements; specific gravity measurements; pneumatic transmitters.

PE-101 & PE-201 Physical Education
The physical education program provides students with the opportunity to maintain a high level of physical fitness and to gain knowledge and experience in a wide variety of individual, dual, and team sports.

G-201 English
Technical writing; business letters; the library and literature searching; technical reports; technical and semi-technical publications.

G-202 Mathematics
Algebra, algebraic and trigonometric equations; curve plotting; conic sections; differentiation and integration.

G-215 Chemical Physics
Matter—atomic structure, atomic numbers, isotopes; electrical nature of matter; electro-chemical action; electro-plating; corrosion; bonding; band theory; solid state; x-rays; photo-electric effect; nuclear structure.

E-202 Electrical Fundamentals
Parallel and series-parallel A.C. circuits; resonance; transformer coupled circuits; A.C. network theorems; two element devices; simple rectifiers; cold cathode diodes, triode; triode amplifier; triode biasing; multigrid tubes.

I-201 Fundamentals of Instrumentation
Electrical pressure transducer; Pirani gage; turbine flow meters, magnetic flow meters; differential pressure transducers; impact flow meters; variable area flow meters; flow integrators and totalizers; electrical level transducers; probe type elements; ultrasonic elements; radiation gages; strain gages; electrical temperature transducers; resistance bulbs; thermo-
couples; temperature difference measurement; dynamics of temperature measurement; potentiometric devices; indicating recording and registering equipment; radiation transducers.

I-202 Electrical Instruments and Practices

Underwriters and codes; resistance and wire tables; selection of conductors; wire and cables; theory of grounding; overcurrent devices; motor circuits. Magnetic effects of electrical current; flux density; systems of units; force on a current carrying conductor in a magnetic field; the Hall effect; the Hall effect Gauss meter; saturable core reactors; self-inductance; the Cathode-ray oscilloscope, impedance bridges; Q meter, self-balancing potentiometer recorder.

G-302 Mathematics

Differential and integral calculus; rates of change; maxima and minima; curve tracing; arc lengths; areas, volumes; centroids; moments of inertia.

I-301 Industrial Electronics

Power supplies; half wave and full-wave rectifiers; filter circuits; regulated power supplies; voltage multipliers; audio amplifiers; oscillators; electronic relays; electronic welding control; electronic motor control; photoelectric devices and control, switching devices; introduction to solid state devices.

I-302 Industrial Hydraulics

Hydraulic system devices; valves; seals; hydraulic jacks; input and output relations; hydraulic formulas; hydraulic fluids; pipes; hoses; fittings; pressure control and relief valves; directional control valves; accumulators; basic hydraulic circuits; electro-pneumatic devices; fluidic devices; hydraulic pumps.

I-303 Process Control

Introduction to principles and function of process control; open and closed loops, theory and application of basic modes of control; on-off; proportional; reset; derivative; pneumatic controller mechanisms; electronic controller mechanisms; current-to-air transducers; current-to-current transducers; recorders; resistance-to-current converter; emf-to-current converters.

I-304 Drafting

Lettering; orthographic projection; dimensioning; electrical symbols; wiring diagrams; electronic schematic drawings; electric power drawing; control system design; hydraulic systems drawing.

I-305 Advanced Measurement

Laboratory and analysis instruments; pH measurement; corrosion; conductivity; gas analysis; spectrometry; chromatography; radiation measurement; density measurements.

I-306 Control Valves

Nomenclature; control valve bodies; control valve actuators; types of valves; control valve sizing; control valve characteristics; engineering data; pipe data; specifications; system design.

G-402 Mathematics

Elementary differential equations; Boolean algebra; analogue and computer operations.

I-401 Process Analysis

Dynamic analysis by transient response; evaluating and improving system performance; analysis of the control function; limitations of process analysis.

I-402 Industrial Control Applications

Pulp and paper industry; petroleum refining; steelmaking; chemical processes, food processing; tours of local industries.
I-403 Computer Programming
and Control
Analogue computers; digital computers; Fortran programming; digital process control; interface devices and peripheral equipment.

I-404 Instrument Systems
Instrument selection; specifications; systems layout; special project.

I-405 Industrial Electronics
Control of D.C. electrical energy to resistance loads; transistor amplifiers; silicon controlled rectifiers; magnetic amplifiers and saturable core reactors; electrical generators; thyatron control; relay, magnetic and solid state logic devices.
Mechanical Technology

Entrance Requirements:
1. Grade XII standing (Vocational Industrial, General or University Entrance Course) with demonstrated proficiency in English, Mathematics and Physical Science (i.e. chemistry and physics).
2. Junior Matriculation or its equivalent if secured prior to December 31, 1963. (Another option is acceptable in place of a second language).

Length of Course:
TWO SCHOOL YEARS, each of ten-months duration, leads to a Diploma in Technology (Dipl. T.). Each of the ten month periods is divided into two equal terms, with final term examinations written at the end of each term. Classes commence in September of each year.

Fees and Expenses:
The tuition fee for the course in Mechanical Technology is $100.00 for each of the four terms. Other expenses include textbooks, incidentals, board and lodging.

Employment Possibilities:
Previous graduates have become established in the following and many other specialties; industrial radiographers, quality control technician, metallurgists, nuclear research assistant, production planner, heating system designer, marketing assistant, work study practitioner, estimator in sheet metal fabrication, weld shop assistant supervisor, nuclear reactor operator trainee, product designer, electric utilities designer. It is apparent from this list that employment opportunities are too wide to be defined.
## COURSE OUTLINE

### First Year

#### TERM 1

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course</th>
<th>Lect.</th>
<th>Lab.</th>
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<td>G-101</td>
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<tr>
<td>G-103</td>
<td>Physics</td>
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<tr>
<td>M-102</td>
<td>Electrical Fundamentals</td>
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<td>Manufacturing Processes</td>
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### Second Year

#### HEAT AND POWER

#### TERM 3

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<td>M-313</td>
<td>Heating &amp; Ventilating</td>
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**PRODUCTION**

**TERM 3**

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COURSE DESCRIPTIONS

G-101 English
Use of the dictionary; sentence structure; punctuation; note-taking; writing precis and paraphrases; essays.

G-102 Mathematics
Numbers and their significance in making computations with measured values; powers of numbers, logarithms and the slide rule; trigonometry; vectors; complex numbers.

G-103 Physics
Basic mechanics: kinematics, dynamics, and energy.
Temperature measurement; thermal expansion; radiation; conduction and convection.
Elementary principles of light and sound.

G-104 Mechanical Drafting
Principles of engineering drawing based on Canadian standards; lettering; instruments and their use; blueprint reading; geometrical drawing; pictorial representation; orthographic projections; sectional views, auxiliary views; isometric and other forms of pictorial drawings; dimensioning; special projects.

M-102 Electrical Fundamentals
An introductory course dealing with the fundamentals of electricity, basic electrical units, batteries, principles of Direct Current, circuits, magnetism.

M-103 Manufacturing Processes
Foundry processes, shaping and planning, milling, broaching, boring, sawing, filing, grinding, measurement and inspection, machine shop practice, sheet metal, forming and time standards.

M-104 Managerial Methods
A general study of the procedures of industrial management; contracts and contract law; introduction to work study; specification and analysis of bids; the bid depository system for subtrades; introduction to accounting; corporation income tax; import duties; sales tax.

M-107 Industrial Materials
A general and detailed study of the properties of the materials of industry, including water and steam, industrial gases, ceramic and organic materials, steels, non-ferrous metals.

PE-101 & PE-102 Physical Education
The Physical Education program provides students with the opportunity to maintain a high level of physical fitness and to gain knowledge and experience in a wide variety of individual, dual, and team sports.

G-201 English
Technical writing; business letters; the library and literature searching; technical reports; technical and semi-technical publications.

G-202 Mathematics
Algebra, algebraic and trigonometric equations; curve plotting; conic sections; differentiation and integration.

G-203 Chemical Physics
Basic chemical principles.
Matter—atomic structure, atomic numbers, isotopes; electrical nature of matter; electro-chemical action; electro-plating; corrosion; bonding; band theory; solid state; x-rays; photo-electric effect; nuclear structure.
M-204 Applied Mechanics
Statics; force and vectors, resolution of forces, free body diagram, equilibrium, simple frames, laws of dry friction, first and second moments of area.
Dynamics; rectilinear and circular motion, force, motion and mass moment of inertia, work, energy and momentum.

M-206 Industrial Electronics
Fundamentals of electronics including such topics as: vacuum tubes, power supplies, amplifiers, oscillators, relays, timers, electronic measurement, fundamentals of electronic control.

M-207 Welding Technology
An extensive study in both theory and practice of the heat-treating of steels, welding and adhesive bonding of metals. The course includes manual, semi-automatic, and automatic methods of welding; effects of heat in the fusion zone and heat-affected zone, together with destructive and non-destructive methods of testing welds.

M-208 Stress Analysis
Poisson's ratio, stress strain relationship, temperature stresses, pressure cylinders, torsion, welded joints, torque, shear and bending; simply supported beams, design of beams, columns, selection of suitable sections for beams and columns; tensile, fatigue, hardness, impact and experimental stress analysis.

HEAT AND POWER

G-302 Mathematics
Differential and integral calculus; rates of change, maxima and minima; curve tracing; arc lengths, areas, volumes, centroids, moments of inertia.

M-310 Instrumentation and Controls
Basic instruments and their uses for measurement and indication of temperature, pressure, flow and speed; primary element, transformation and amplification of signals; indicators, recorders and controllers as applied to pneumatic, hydraulic, electrical and electronics control systems.

M-313 Heating and Ventilation
Introduction to and use of ASHRAE Guide and Data Book. Heat and change of state; heat transfer; properties of air psychrometry; psychrometric chart; comfort heating and cooling; air conditioning load analysis; load calculations; heating systems.

M-314 Plant Engineering
A general study of the mechanical and electrical services of buildings. Electric motors; controls; pumps; fans; heating; air conditioning; electrical; plumbing; lighting; sprinkler systems, permafrost.

M-315 Industrial Fluid Mechanics
Viscosity, pressure, Reynolds and Mach number, Bernoulli's Equation; flow losses, specific speed, immersed bodies, lift and drag; flow measurement. The course includes practice in the industrial hydraulic circuits and valves, flow measurement, instrumentation, industrial furnaces, fans and pumps.

M-321 Machine Design
Application of strength of materials to mechanical design; simple stress analysis; materials and their properties; variable loads and stress concentrations; couplings; brakes.
M-326 Thermodynamics
The study of the conversion of heat and energy; thermodynamic laws and processes; heat engines and their cycles; gases, vapors, and mixtures.

M-327 Library Research
Supervised technical research with current periodicals. This includes work on Air Conditioning, Refrigeration, Machine Design, I.C. Engines, etc.

M-405 Automatic Control
A course of study of the design of complete control systems, including instrument service piping, panel layout, and accessories for pneumatic, electric, and hydraulic systems. The course includes material handling systems, electronic data processing and servo systems.

M-407 Technical Research and Report
A technical research involving library investigation, practical work and field investigation.

M-409 Work Study
Methods study, motion study, work sampling, plant layout, material handling, stop watch work measurement, predetermined time systems, job evaluation and merit rating, learning curves, cost analysis, planning, scheduling, monitoring, forecasting and replanning.

M-413 Heating and Ventilation
A continuation of Course M-313 with air duct design; equipment selection; air conditioning systems; control systems; air distribution; hand tools in sheet metal; metal allowances; types of seams; dampers; grilles; fans.

M-414 Refrigeration
Simple refrigeration cycles; refrigerants and their properties; compressors; condensers; expansion valves; evaporators; auxiliary equipment.

M-415 Internal Combustion Engines
A course covering the operation of spark ignition and compression ignition engines including; engine components; air cycle approximation; fuel-air cycle approximation (using charts); actual engine cycle; engine friction; detonation; air capacity; carburetors.

M-421 Machine Design
A continuation of course M-307 for bearings; screw fastenings; springs; spur gears; helical gears.

M-426 Thermodynamics
A continuation of course M-306 including analysis of vapor and gas power cycles; performances of steam turbines; I.C. engines and steam generators; refrigeration; nozzle theory; introduction of heat transfer.

G-302 Mathematics
Differential and integral calculus; rates of change, maxima and minima; curve tracing; arc lengths, areas, volumes, centroids, moments of inertia.

M-302 Metallurgy
Mechanical and non-destructive tests, macro examination of metals, micro examination, solidification of metals, phase diagrams and their interpretation, deformation and annealing, iron and carbon steel, heat treatment of steel, alloy steels, cast iron, light alloys, miscellaneous non-ferrous alloys, corrosion phenomena, high temperature alloys, metallurgical aspects of metal joining.

PRODUCTION TECHNOLOGY
M-309 Work Study
Methods study, motion study, work sampling, plant layout, material handling, stop watch work measurement, predetermined time systems, job evaluation and merit rating, learning curves, cost analysis, planning, scheduling, monitoring, forecasting and replanning.

M-310 Instrument and Controls
Basic instruments and their uses for measurement and indication of temperature, pressure, flow and speed; primary element, transformation and amplification of signals; indicators, recorders and controllers as applied to pneumatic, hydraulic, electrical and electronic control systems.

M-312 Non-Destructive Testing
Licensing of NDT technicians, flaws and their detection, zero defect programs, photography and its principles, ultrasonic flaw detection by longitudinal, shear, and surface waves, calibration of ultrasonic transducer shoes, dye penetrants and leak testing, magnaflux, eddy current testing, theory and practice of radiography with tube and gamma camera, optical comparator and surface roughness indicator methods.

M-315 Industrial Fluid Mechanics
Viscosity, pressure, Reynold's and Mach Number, Bernoulli's Equation; flow losses, specific speed, immersed bodies, lift and drag; flow measurement. The course includes practice in industrial hydraulic circuits and valves, flow measurement, instrumentation, industrial furnaces, fans and pumps.

M-331 Machine and Tool Design
Topics in stress analysis, elastic and plastic bending, design for deformation in tooling, residual and fatigue stress, stress concentrations and their control, fasteners, bearings and shafting, electric resistance strain gauge techniques, die sets, punches, dies, strippers and accessories for piercing, blanking, and bending, stock material layouts for presswork, presses, tolerances, principal stresses and strain gauge rosettes.

M-403 Advanced Manufacturing Practices
Soldering, brazing, induction heating methods, design of induction heating coils, vacuum technology and atmospheres, study of machineability and the free-cutting metals, automatic welding setups and welding positioners, cladding and dilution in welds, casting and powder metallurgy, tooling and production runs on single and multiple spindle automatic lathes, universal grinder, programming for numerically - controlled machine tools using fixed sequential, word address, and tab sequential methods, metal cleaning, finishing, and protective coatings, use of tubing stock as raw material.

M-405 Automatic Control
A course of study of the design of complete control systems, including instrument service, piping, panel layout, and accessories for pneumatic, electric, and hydraulic systems. The course includes material handling systems, electronic data processing and servo systems.

M-407 Technical Research and Report
A technical research involving library investigation, practical work and field investigation.

M-411 Production Planning
The shop and office organization of job and production work in manufacturing, including the principles and procedures of paper system, material handling, inventory management, and procurement. This course will include such topics as: process planning, estimating, scheduling, plant loading and dispatching.
M-427 Statistical Methods
Introduction to statistics as related to quality control; history, definition, statistical quality control training programs; frequency distributions, graphs of frequency distributions, the calculations of range, arithmetic mean, median, mode, variance, and standard deviation; probability distributions: the binomial distribution, the Poisson distribution, and the normal distribution; curve fitting; the method of least squares, inferences based on the least-squares estimators. Probability: introduction, definitions of probability, the addition and multiplication theorems. Permutations and combinations.

M-428 Material Handling
Basic concepts of material handling, the unit load, design of unit loads, receiving and shipping procedures, loading of semis and rail cars, transportation and tariffs, warehouse trucks, conveyors, racking and storage, design of work stations, plant utilities, ventilation, safety, general plant layout, material flow.

M-429 Accounting
Double entry bookkeeping, adjustment of trial balances, preparation of financial and manufacturing statements. Cost accounting records; material control, labour and overhead distribution; job order, process and standard costs. Mathematics applied to business problems. Basic principles of economics including economic aims, the theory of prices and production output by business firms under various degrees of competition.

M-431 Tooling Practices
Tool steels, numerical control and electric discharge machining as applied to die sinking, the applications of polyurethane rubber, epoxy, silastic, and magnesium plate to tooling, drawing of sheet, hot forming, cold forming, upsetting, rotary swaging, and forging, tube bending, die prove-outs, control of die and tooling inventory, theory and practice of fixturing.
Certificate Courses
Library Assistants

Entrance Requirements:
1. Grade XII standing (General or University Entrance Course) with demonstrated proficiency in English.
2. Junior Matriculation or its equivalent if secured prior to December 31, 1963.

Length of Course:
ONE SCHOOL YEAR (approximately ten months), divided into two equal terms, with final examinations written at the end of each term. During second term, practical experience will be gained by working in a library of recognized standing. Classes commence in September of each year.

**Fees and Expenses:**
The tuition fee for the course in Library Assistants is $100.00 for each of the two terms. Other expenses include textbooks, incidentals, board and lodging.

Nature of Programme:
The course is designed for high school graduates desiring to work in a library.

Since libraries have become more and more specialized in their functions, the Library Assistants course is designed to provide the basic training and knowledge to enable the graduate to adapt readily and quickly into any library system. The scope of the course is sufficiently broad and detailed to give the student a thorough preparation for general library work wherever he or she may find employment.

The ability to type is essential. Students entering this program without this skill, will attend typing classes.

Note: *
See Page 13 for details re: Training Allowances.
# COURSE OUTLINE

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<tr>
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<th>Lab.</th>
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</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

*From March through May, students spend five half days per week in established libraries for practical experience.*
COURSE DESCRIPTIONS

L-101 Librarianship and History of Libraries
Definition and History; types; work and purpose of libraries; work of professional librarian; work of library assistants; work and place of library association.

L-102 Organization of Libraries
Development of public libraries; objectives; standard of service; library legislation; relations of province, municipal and city libraries regarding finances; trustees and library boards; regional libraries and municipal libraries; library co-operation; departments within libraries — functioning of each.

L-103 Cataloguing and Classification
Purpose; Dewey decimal system; the catalogue (a) card form, (b) use of the catalogue, (c) subject headings, (d) filing cards.

L-104 Reference
Basic reference books; government documents; Bibliography, what it is and how it assists.

L-105 Literature
Classics; Canadian authors; British and American authors.

L-201 Administration
Organizing a day's work; public relations — displays, adult education, talks; responsibility of librarian to library, to library board, to community; writing an annual report; preparing a budget; statistics; circulation systems.

L-202 Library Techniques
Circulation system; interlibrary loans; discarding; shelving and inventory; binding and repair of books.

L-203 Special Libraries
Government libraries; academic libraries; business and industrial libraries; work with children and young people. Literature of the special library; source of material; printed aids for book selection.

L-204 Book Selection and Ordering
Needs of community; printed aids; how and where to order; discounts; donations; periodicals; vertical file (information file).

L-205 Literature
History; Canadian Literature; modern American literature.
Operating Engineers

Entrance Requirements:
1. Grade XII standing (Vocational Industrial, General or University Entrance Course) with demonstrated proficiency in English, Mathematics, and the Physical Sciences (i.e. chemistry and physics) or in exceptional cases, by the consent of the Board of Admissions.

2. Junior Matriculation or its equivalent if secured prior to December 31, 1963. (Another option is acceptable in place of a second language.)

Length of Course:
ONE SCHOOL YEAR of approximately 10 months duration with courses commencing in September of each year. Upon graduation, the Fourth Class Certificate is immediately obtainable following the successful completion of the Provincial Examinations.

*Fees and Expenses:
The tuition for the Operating Engineers' course is $200.00 per year. Other expenses include textbooks, incidentals, board and lodging.

Employment Possibilities:
Operating Engineers are responsible for the safe operation of mechanical equipment in Industry, Utilities, Commercial Buildings and Institutions. They are examined and licensed under the Boiler Plant and Pressure Vessels Act.

Industry in Manitoba is diversified. A few examples of industries relying on Operating Engineers' services are: Meat Packers; Cold Storage Plants; Laundry and Dry Cleaning Plants; Dairies; Food Processing Plants and Breweries. In these plants, Operating Engineers are responsible for the operation of steam boilers, refrigeration compressors, air compressors and the associated distribution systems for each.

Opportunities for advancement are always open. Usually, after one year of experience, the Fourth Class Certificate holder can qualify to write the Third Class Examinations. Success in this, brings added responsibility and remuner-
The requirements increase for qualification to write the Second Class, and ultimately the First Class Examinations. The responsibility that an Operating Engineer is allowed to assume increases with each classification. Many hours of home study and conscientious working effort are required to obtain the higher Certificates, but the financial reward and the increased stature provide ample compensation.

*Note:* See Page 13 for details re: Training Allowances.

### COURSE OUTLINE

<table>
<thead>
<tr>
<th>Course No.</th>
<th>COURSE</th>
<th>TERM 1</th>
<th>HOURS per WEEK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lect.</td>
<td>Lab.</td>
</tr>
<tr>
<td>OE-101</td>
<td>Power Plant Theory &amp; Practice</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>OE-102</td>
<td>Electricity</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>OE-103</td>
<td>Instruments &amp; Controls</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>OE-104</td>
<td>Mathematics</td>
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<td>0</td>
</tr>
<tr>
<td>OE-105</td>
<td>Physics</td>
<td>1</td>
<td>2</td>
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<tr>
<td>OE-106</td>
<td>Chemistry</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>OE-107</td>
<td>English</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>OE-108</td>
<td>Drafting</td>
<td>2</td>
<td>0</td>
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<tr>
<td></td>
<td></td>
<td>21</td>
<td>10</td>
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<tr>
<td>OE-109</td>
<td>Machine Shop — practical</td>
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<td>2 weeks (60 hours)</td>
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### TERM 2

<table>
<thead>
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<th>Course No.</th>
<th>COURSE</th>
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<th>HOURS per WEEK</th>
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<td></td>
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<tr>
<td>OE-201</td>
<td>Power Plant Theory &amp; Practice</td>
<td>7</td>
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<td>Electricity</td>
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<tr>
<td>OE-203</td>
<td>Instruments &amp; Controls</td>
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<tr>
<td>OE-204</td>
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<tr>
<td>OE-205</td>
<td>Physics</td>
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<tr>
<td>OE-206</td>
<td>Chemistry</td>
<td>2</td>
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</tr>
<tr>
<td>OE-207</td>
<td>English</td>
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<tr>
<td>OE-208</td>
<td>Drafting</td>
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<td>0</td>
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<tr>
<td></td>
<td></td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>OE-210</td>
<td>Welding — practical</td>
<td></td>
<td>2 weeks (60 hours)</td>
</tr>
</tbody>
</table>
OE-101 Power Plant Theory and Practice

(a) Section I — Steam Generation
Types of boilers and their application; boiler and furnace construction and details; heat transfer, water circulation, draft; characteristics of fuels and firing equipment for each. Theory of combustion.

(b) Section II — Steam Use
Heat of steam; use of steam tables. Simple steam engines and pumps. Turbine theory, types, and operation; condensers.

(c) Section III — Mechanical Principles and Auxiliary Equipment
Acts and codes, materials of construction; laws of machines; mechanical power transmission; pipes and pipe fitting; pumps and injectors.

(d) Section IV — Refrigeration
Theory and basic mechanical compression cycle; types and details of system components; characteristics of common refrigerants.

OE-102 Electricity

Electron theory; Ohm's Law; magnetism and induction; D.C. circuits; parallel and series; Lenz's Law; D.C. measuring instruments; D.C. motors and generators; principles of A.C. current; impedance; power factor.

OE-103 Instrumentation and Controls

Fundamentals of temperature; pressure and flow measurement. Control valves; semi-automatic and programming flame failure protection systems; flame rod and photo electrical cell types and applications; self-actuating controls for refrigeration systems.

OE-104 & OE-204 Mathematics

Number and numerical calculations; mensuration, powers and roots; algebra — fundamental operations, linear and quadratic equations; problems with one and two unknowns; use and transposition of formulae; analytic geometry — straight line, circle, parabola in Cartesian co-ordinates; use of graphs and graphic methods; trigonometric functions; vectors; logarithms, use of the slide rule.

OE-105 & OE-205 Physics

Units and measurements; motion, velocity and acceleration; vectors; moments of forces; resolution of forces; work, mechanical advantage, power and energy; energy transfer and equations; terms and laws of mechanics in reference to gases and liquids; Archimedes principle; temperature measurement; thermal expansion; heat quantities; heat transfer.

OE-106 Chemistry

Matter — elements, compounds and mixtures; physical and chemical change; atoms and molecules; chemical nomenclature; valence; chemical equations.

Gases — gas laws; preparation and properties of industrial gases; safety.

OE-107 & OE-207 English

A course designed to improve the student's ability to study and improve his critical thinking as well as reading and writing skills. It demonstrates how elementary logic, fundamental writing techniques, outlining, summarizing, paragraphing, vocabulary, grammar, spelling, capitalization, punctuation are applied to the writing of short informal library research reports, business correspondence and technical explanations.
OE-108 Drafting and Blueprint Reading
The language of drafting; use and care of instruments; pictorial representation; views; dimensions and tolerances; sections.

OE-109 Machine Shop Practice
Students will undertake a project involving use of hand tools and an introduction to the operation, capabilities and care of machine tools.

OE-201 Power Plant Theory and Practice
(a) Section I — Steam Generation
Feed water equipment, pumps; injectors; open, closed and deaerating heaters. Feedwater treatment; boiler operation and management; cost and efficiency calculations by log keeping.
(b) Section II — Steam Use
Heating systems, return systems; traps and air venting; heat exchangers; heating in air-conditioning systems. Engine management, operation and maintenance.
(c) Section III — Mechanical Principles and Auxiliary Equipment
Lubrication; air fans; corrosion. Preventive maintenance practices; equipment installation. Introduction to the gas turbine and heat pump.
(d) Section IV — Refrigeration
Installation and operation of direct and indirect systems. Refrigeration codes, maintenance and trouble shooting. Insulation; air-conditioning and humidity control, the absorption system.

OE-202 Electricity
Single and polyphase circuits. A.C. transformers, motors and generators; A.C. measuring instruments; switches, circuit breakers, motor starters. Preventive and running maintenance of plant electrical equipment; code; elementary electronics.

OE-203 Instruments and Controls
Theory of on-off, proportional, reset, rate and floating control. Typical pneumatic and electrical boiler combustion control system; automatic draft regulation; electrical controls for refrigeration and air-conditioning systems.

OE-206 Chemistry
Acids, bases and salts; solutions; PH; neutralization; ionization; oxidation and reduction.
Thermo-chemistry; combustion; latent heat; heat and work; first and second laws of thermodynamics; reversible and irreversible processes; Carnot cycle; heat engines; corrosion; feedwater treatment.

OE-208 Drafting
Shop sketching; orthographic, oblique and isometric sketching and drawing practice. Electrical and pipefitting symbols and layout drawings.

OE-210 Welding
Students will be introduced to oxy-acetylene. The capabilities and the safe operation and proper care of welding equipment.
Medical Courses
Medical Laboratory Technology

A program of training for Medical Laboratory Technologists has been developed by many of the larger hospitals and the Provincial Laboratories of Manitoba in conjunction with the Manitoba Institute of Technology.

Entrance Requirements:

1. Grade XII, University Entrance Course with credits in English 300, Mathematics 300, Chemistry 300, either Physics 300 or Biology 300, and one of French 300, Latin 300, German 300, Modern History 300, Human Geography 300.

2. For the school year 1967-68, Grade XII, General Course with credits in English 301, Maths 301, Physical Science 301, Biology 301, Social Studies 301 and any two other subjects acceptable for Grade XII General Course standing will be considered for admission.

Applications for Admission:

Applications and enquiries from prospective students (male and females) should be made to any of the hospitals approved by the Canadian Society of Laboratory Technologists for student training, or to the Department of Health. Do not apply to the Manitoba Institute of Technology.

TRAINING HOSPITALS:

Brandon General Hospital, Brandon, Manitoba.

Deer Lodge Hospital (D.V.A.), Portage & Woodlawn, Winnipeg 12, Manitoba.

Department of Health School, 411 Norquay Building, Winnipeg 1, Manitoba.

Grace Hospital, Preston & Arlington, Winnipeg 10, Manitoba.

Misericordia General Hospital, 99 Cornish Avenue, Winnipeg 1, Manitoba.

St. Boniface General Hospital, 409 Tache Avenue, St. Boniface 6, Manitoba.

Winnipeg General Hospital, 700 William Avenue, Winnipeg 3, Manitoba.
Length of Course:

The training program is divided into two parts:

1. Nine months training is given at the Manitoba Institute of Technology.

2. A minimum of at least 1 year apprenticeship training is given at one of the approved Hospital Training Schools.

Total length of Course — approximately 21 months.

*Tuition Fee:

$180.00 for nine months at the Manitoba Institute of Technology.

Note: *

See Page 13 for details re: Training Allowances.

Employment Possibilities:

Satisfactory completion of training qualifies the student to write registration examinations with the Canadian Society of Laboratory Technologists. Successful Candidates will be awarded a certificate (R.T.) which is recognized anywhere in Canada.

Further training and experience can lead to advanced certification with the C.S.L.T. There is a great demand for registered Medical Laboratory Technologists in hospital laboratories, medical clinics, research projects and some commercial companies.

COURSE OUTLINE

<table>
<thead>
<tr>
<th>Course No.</th>
<th>COURSE</th>
<th>TERM 1</th>
<th>HOURS per WEEK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lect.</td>
<td>Lab.</td>
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<tr>
<td>ML-101</td>
<td>Anatomy and Physiology</td>
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<tr>
<td>ML-102</td>
<td>Medical Microbiology and Immunology</td>
<td>2</td>
<td>5</td>
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<tr>
<td>ML-103</td>
<td>Clinical Chemistry</td>
<td>3</td>
<td>5</td>
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<tr>
<td>ML-104</td>
<td>Hematology</td>
<td>3</td>
<td>4</td>
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<tr>
<td>ML-105</td>
<td>Histology</td>
<td>1</td>
<td>3</td>
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<tr>
<td>ML-106</td>
<td>Student Seminar</td>
<td>2</td>
<td>0</td>
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<tr>
<td>ML-107</td>
<td>Blood Bank Serology</td>
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</table>

13 19
Course No.  | COURSE                               | TERM 2 | HOURS per WEEK
|-----------|--------------------------------------|--------|----------------
| ML-201    | Anatomy and Physiology               |        | 2 0            
| ML-202    | Medical Microbiology and Immunology  |        | 2 5            
| ML-203    | Clinical Chemistry                   |        | 3 5            
| ML-204    | Hematology                           |        | 3 4            
| ML-205    | Histology                            |        | 1 3            
| ML-206    | Student Seminar                      |        | 2 0            
| ML-207    | Blood Bank Serology                  |        | 0 2            

**COURSE DESCRIPTIONS**

ML-101 & ML-201 Anatomy and Physiology

Cell structure and physiology; anatomy of benign and malignant tumors; urinary, gastro-intestinal, respiratory, circulatory, and reproductive systems.

ML-102 & ML-202 Medical Microbiology and Immunology

Principles and practice of aseptic techniques; the isolation and identification of common bacteria, parasites and fungi. Preparation of stains, media and the operation of equipment used. Basic principles of immunology and serology.

ML-103 & ML-203 Clinical Chemistry

Biochemical analyses of blood and other biological fluids related to diseases. Kidney function and liver function tests, enzyme studies, body fluid electrolyte balance studies. Basic instrumentation — photoelectric colorimeters, spectrophotometers, autoanalyzer, flame photometer, pH meters, microgasometer, and analytical balances.

ML-104 & ML-204 Haematology

The science of the blood, its nature, functions and diseases. Origin, development and nomenclature of blood and marrow cells. Blood collection procedures; principles and techniques of blood examinations; blood coagulation; disorders of hemostasis; recognition of blood disorders such as anemias and leukemias.

ML-105 & ML-205 Histology

Preparation of solutions and stains; basic principles of fixation, dehydration, clearing and embedding of tissue. Procedures for cutting and staining paraffin sections. Special staining procedures for — connective tissue, elastic fibres, fat, micro-organisms and haemosiderin.

ML-106 & ML-206 Student Seminar

Each student is required to prepare and present a paper on an assigned topic.

ML-107 & ML-207 Blood Bank Serology

Medical Radiological Technology

(X-Ray, Radioisotope and Therapy Technicians)

Entrance Requirements:

1. Grade XII University Entrance Course with credits in English 300, Mathematics 300, Science 300, Language 300, and one other 300 option.

2. For the school year 1967-68, a limited number of General Course students may be accepted. The acceptance of General Course students is subject to the policy of the individual training school. Students having an average of 65% or over with credits in English 301, Mathematics 301, Social Studies 301, Physical Science 301, Biology 301 and two other 301 optional subjects may be eligible.

   The applicant must be 18 years of age, in robust health, accurate, ambitious, of pleasing personality, and be interested in, and sympathetic with persons who are ill or disabled.

Entrance Dates:

Two classes will be accepted at the Institute each year, the first in September and the second in January.

Applications for Admission:

Apply directly to "Radiological Technician Training Program" at any of the Hospitals or Institutions operating training programs. DO NOT APPLY TO THE MANITOBA INSTITUTE OF TECHNOLOGY.
DIAGNOSTIC TECHNIQUES:

Brandon General Hospital,
Brandon, Manitoba.

Children's Hospital of Winnipeg,
685 Bannatyne Avenue,
Winnipeg 3, Manitoba.

Deer Lodge Hospital (D.V.A.)
Portage & Woodlawn,
Winnipeg 12, Manitoba.

Department of Health School,
411 Norquay Building,
Winnipeg 1, Manitoba.

Grace Hospital,
Preston & Arlington,
Winnipeg 10, Manitoba.

Misericordia General Hospital,
99 Cornish Avenue,
Winnipeg 1, Manitoba.

St. Boniface General Hospital,
409 Tache Avenue,
St. Boniface 6, Manitoba.

Victoria General Hospital,
424 River Avenue,
Winnipeg 13, Manitoba.

Winnipeg General Hospital,
700 William Avenue,
Winnipeg 3, Manitoba.

RADIOISOTOPE TECHNIQUES:

Manitoba Cancer Treatment & Research Foundation,
700 Bannatyne Avenue,
Winnipeg 3, Manitoba.

Radiotherapy Department,
St. Boniface General Hospital,
409 Tache Avenue,
St. Boniface 6, Manitoba.
THERAPEUTIC TECHNIQUES:

Manitoba Cancer Treatment & Research Foundation,
700 William Avenue,
Winnipeg 3, Manitoba.

St. Boniface General Hospital,
409 Tache Avenue,
St. Boniface 6, Manitoba.

Length and Type of Course:

Two years — leads to a diploma as registered Technician (R.T.) in the Canadian Society of Radiological Technicians.

After commencing training, the student may be transferred to the Manitoba Institute of Technology where intensive lectures and demonstrations are given. This is followed by examinations which, if satisfactory, allow the student to return to his or her hospital to spend the balance of the two-year training period gaining practical experience under close supervision of the x-ray or radiotherapy department.

The probation period may extend from 3 to 6 months, depending upon the training hospital. The hospitals have the authority to recommend that the students write the qualifying examinations of the Canadian Society of Radiological Technicians. At the end of a two year period, the student writes the examination leading to a Diploma as Registered Radiological Technician (R.T.R.), Registered Radiotherapy Technician (R.T.T.) or Registered Radioisotope Technician (R.T.I.).

Tuition Fee:

The tuition fee is $80.00 for the term at the Manitoba Institute of Technology. Other expenses include books, incidentals, board and lodging.

Expenses:

No living quarters are provided at M.I.T. or some hospitals. A student allowance is paid by the hospital for the time spent in the hospital. No pay is given during the time spent away from the Hospital at the Institute.

Students demonstrating a need for financial assistance during the time at M.I.T. will be able to negotiate a formal loan from their hospital upon agreement to repay from subsequent allowances or otherwise.
Employment Possibilities:

Radiographic, therapeutic and radioisotope departments in large general hospitals in most large cities in Canada, U.S.A., Great Britain and Australia.

Some technicians are employed as technical advisors and representatives for X-Ray equipment and supplies manufacturers. Others are engaged in aspects of teaching or research.

The R.T. Diploma is recognized across Canada and in the U.S.A., Great Britain and Australia.

COURSE OUTLINE

The following syllabus is approved by the Canadian Society of Radiological Technicians in co-operation with the Canadian Association of Radiologists.

The class hours designated for each of the following subjects are:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Lecture</th>
<th>Practical</th>
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<tbody>
<tr>
<td>Introductory Lectures</td>
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</tr>
<tr>
<td>Anatomy, Physiology &amp; Pathology</td>
<td>76</td>
<td>10</td>
</tr>
<tr>
<td>Nursing Procedures &amp; Ethics</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Physics of Electricity &amp; Magnetism</td>
<td>55</td>
<td>25</td>
</tr>
<tr>
<td>Radiation, Physics &amp; Protection</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Apparatus and Accessory Equipment</td>
<td>55</td>
<td>25</td>
</tr>
<tr>
<td>Photographic Aspects of Radiography</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>Radiographic Positioning</td>
<td>50</td>
<td>84</td>
</tr>
<tr>
<td>Radiographic Technique</td>
<td>10</td>
<td>25</td>
</tr>
</tbody>
</table>

COURSE DESCRIPTIONS

Introductory Lectures

History of radiology development; history of registered radiological technician departmental administration.

Anatomy, Physiology and Pathology

Classification of bones. Bone description of: upper extremity — shoulder, arm, forearm, wrist, and hand; lower extremity — thigh, leg, foot, pelvic girdle; vertebral column — general and special characteristics of vertebrae, cervical, thoracic lumbar, sacral, coccygeal; ribs and sternum; skull and facial bones; digestive system and accessory organs; respiratory system; circulatory system; urogenital system; lymphatic system; nervous system; endocrine system. Short discussion of pathology most often occurring in each area.

Nursing Procedures and Ethics

Techniques of moving, lifting and transferring patients; elementary nursing procedures; care and comfort of the patient; aseptic technique and isolation procedures.
Physics of Electricity and Magnetism
Elementary theory of magnets, magnetic fields, inverse square law, electrification by friction, properties of conductors and insulators, electroscopes. Elementary discussion of atomic theory of matter. Electric currents and circuits, Ohm's Law, electromagnets, ammeters, voltmeters, fuses and circuit breakers, measurement of electric power, principles of transformers. Discussion of electromagnetic spectrum x-rays, scattered radiation, detection of x-radiation, units of quantity, quality of x-ray beam.

Radiation Physics and Protection

Apparatus and Accessory Equipment
Distribution of electric power, transformers, types of rectification, x-ray tube, history and development, focal spot size and cooling charts. Instruments for control of time, K.V.P. and M.A., grids, diaphragms, cones and collimators, viewing devices, filters, spot film devices, stereoscopy image amplification, photo fluorography, body section radiography.

Photographic Aspects of Radiography

Radiographic Positioning
Positioning techniques for the various anatomical divisions (see under Anatomy and Physiology).

Radiographic Technique
The four basic factors in photographic effect. Technical terms used to describe the quality of radiographs and how they may be varied. Conditions influencing variations in exposure technique, identification systems.
Combined Courses in...

**Medical Laboratory**

and

**Radiological Technologies**

The Provincial Department of Health has a program for training suitable students for a combined qualification in the two fields of Laboratory and X-Ray technology. The academic nature of the training program can be obtained by reading the accounts of the separate courses, given elsewhere in this calendar or in the individual brochures describing the respective course.

**Entrance Requirements:**

1. Grade XII, University Entrance with credits in English 300, Mathematics 300, Chemistry 300, Physics or Biology 300, and one Language 300. A minimum overall average of 60% is recommended.

2. For the school year 1967-68, Grade XII, General Course with credits in English 301, Mathematics 301, Physical Science 301, Biology 301, Social Studies 301, and any two other 301 subjects acceptable for the Grade XII General Course standing will be considered for admission. A minimum overall average of 65% must be attained. To qualify for certification in X-Ray Technology, the candidate's application must be reviewed and accepted on an individual basis by the Manitoba Division of the Canadian Society of Radiological Technicians.

**Length of Course:** Twenty-Four Months

1. Nine months didactic training in Laboratory Technology is given at the Manitoba Institute of Technology — see details under "Medical Laboratory Technology."

2. During the following fifteen months arrangements are made for the student to receive nine months' apprenticeship training in an approved hospital training school.

3. Within the above fifteen-month period, the class in two sections will return to the Manitoba Institute of Technology to receive four months didactic training in Medical Radiological Technology — (see details under "Medical Radiological
Technology”). This is followed by an intensive two months’ clinical orientation period at the Manitoba Department of Health X-Ray training school in Portage la Prairie.

The above course leading to registration in Laboratory Technology, with additional basic training in Radiological Technology, makes twenty-four months.

This whole program is presently under review.

Certification:

After training, students are eligible to write examinations for certification in the Canadian Society of Laboratory Technologists.

A total of two years’ training and experience is required for eligibility to write examinations leading to certification with the Canadian Society of Radiological Technicians. Time spent in Government Service after completing this course may be counted towards this registration but a further four months apprenticeship training, at an elective period, in an approved hospital training school is required for eligibility for those desiring this second certification.

Financial Assistance:

A bursary of $100.00 a month is provided during the first year of training and $120.00 a month during the second year. Graduates are required to accept employment with the Manitoba Government or in Rural Manitoba for a period equal to the length of training. Tuition fees are paid, and an allowance for textbooks and uniforms is made.

Accommodation:

Students are responsible for their own room and board throughout the training period. The Manitoba Institute of Technology keeps a registry of known accommodations suitable to students. Similarly the Department of Health knows of accommodation usually available in this field.

Employment:

There are unlimited opportunities in this rapidly expanding field in provincial laboratory and x-ray units, and in hospitals and medical clinics throughout Manitoba. Canadian Certification in these two fields is widely recognized in all the provinces and other countries including most U.S.A. States, and the British Commonwealth.
Salary:

The present salary range for certified technologists in provincial institutions is $326.00 - $544.00 per month.

For Additional Information Contact:

Combined Technician Training Program, Manitoba Department of Health, 411 Norquay Building, Winnipeg 1, Manitoba.

Cadham Public Health Laboratory, Medical College Building, Emily and Bannatyne, Winnipeg 3, Manitoba.

Laboratory, Hospital for Mental Diseases, Brandon, Manitoba.

Laboratory and X-Ray Services, P.O. Box 24, Portage la Prairie, Manitoba.

Laboratory and X-Ray Unit Headquarters at:

Birtle - Shoal Lake Laboratory and X-Ray Unit, Birtle District Hospital, Birtle, Manitoba.

Dauphin Laboratory and X-Ray Unit, Dauphin General Hospital, Dauphin, Manitoba.

Neepawa Laboratory and X-Ray Unit, Neepawa District Hospital, Neepawa, Manitoba.

Portage Laboratory and X-Ray Unit, Portage la Prairie General Hospital, Portage la Prairie, Manitoba.

Selkirk Laboratory and X-Ray Unit, Selkirk General Hospital, Selkirk, Manitoba.

Southwest Laboratory and X-Ray Unit, Killarney and District Hospital, Killarney, Manitoba.

Swan Valley Laboratory and X-Ray Unit, Swan Valley District Hospital, Swan River, Manitoba.

Virden Laboratory and X-Ray Unit, Virden District Hospital, Virden, Manitoba.