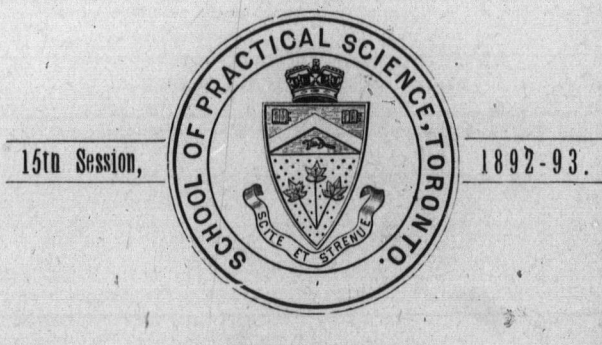


CALENDAR  
OF THE  
SCHOOL OF PRACTICAL SCIENCE  
PROVINCE OF ONTARIO,  
WITH A  
SYLLABUS

OF THE  
*Courses of Instruction and the Regulations for  
Diplomas.*



TORONTO:  
PRINTED BY WARWICK & SONS, 68 AND 70 FRONT STREET WEST.  
1892.

Calen  
Time  
Facul  
Gener  
Order  
Form  
Regu  
Fees.  
Estin  
Fello  
Regu  
Vacat  
Suppl  
Prize  
Regu  
Depa

Four  
Degre  
Act r  
Degre  
Synop  
Engin  
Chem  
Assay  
Physi  
Mode  
Libra  
Socie  
Stude  
Prize  
Univ  
Grad



# CONTENTS.

	PAGE.
Calendar .....	4
Time Tables .....	5-7
Faculty .....	8
General Description .....	9
Order in Council .....	11
Form of Diploma .....	13
Regular Courses .....	14
Fees, Deposits, etc. ....	14
Estimated Expenses of a Regular Course .....	15
Fellowships .....	15
Regulations .....	15
Vacation Work .....	17, 49
Supplemental Examinations .....	18
Prizes .....	19
Regular Examinations .....	19
Department of Civil Engineering .....	21
Mechanical and Electrical Engineering .....	24
Mining Engineering .....	27
Architecture .....	30
Analytical and Applied Chemistry .....	33
Fourth or Last Graduate Year .....	35
Degree of B.A. Sc. ....	38
Act respecting Dominion and Provincial Land Surveyors .....	39
Degree of C.E. ....	41-
Synopsis of Courses of Lectures, Fees for Special Students, etc. ....	42
Engineering Laboratory .....	50
Chemical .....	52
Assaying .....	52
Physical .....	52
Modern Languages .....	53
Library, Museum, etc. ....	53
Societies .....	53
Students in Attendance .....	55
Prizemen .....	58
University Graduates in Civil Engineering .....	59
Graduates of School of Practical Science .....	60

1892.

SEPTEMBER.

SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

23. Meeting of Council.  
28. Entrance Examinations begin.

OCTOBER.

SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

1. **FIRST TERM** begins. Supplemental Examinations begin.  
14. Meeting of Council.

NOVEMBER.

SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

11. Meeting of Council.

1892-93.

DECEMBER.

SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

9. Meeting of Council.  
23. **FIRST TERM** ends.

JANUARY.

SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

9. **SECOND TERM** begins.  
13. Meeting of Council.

FEBRUARY.

SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

10. Meeting of Council.  
15. Ash Wednesday.  
Building closed.

MARCH.

SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

10. Meeting of Council.  
31. Good Friday.  
Building closed.

APRIL.

SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

10. Lectures and Practical Work close.  
14. Meeting of Council.  
17. Examinations begin.

MAY.

SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

1. **SECOND TERM** ends.

ER.	FRI.	SAT.
3	4	5
0	11	12
7	18	19
4	25	26

RY.	FRI.	SAT.
2	3	4
9	10	11
6	17	18
3	24	25

TIME TABLE - FIRST YEAR - SESSION 1892-3.

MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	Hours.
9-10 Drawing.	Drawing.	*Conics.	Drawing.	Drawing, Practical Chemistry, 1, 4, 5.	9-10
10-11 Drawing, 1, 3, 4, 5; 2, (b). *Electricity and Magnetism, 2, 7, (a).	Drawing.	Drawing, Electricity, 2, 4 (a).	Drawing, 1, 3, 4, 5; 2, (b). *Electricity and Magnetism, 2, 7, (a).	Drawing, Practical Chemistry, J, 4, 5.	10-11
11-12 *Geometry and Trigonometry.	*Chemistry.	*Chemistry.	*Chemistry.	*Algebra.	11-12
12-1 Statics.	*Trigonometry.	Statics.	*Trigonometry.	Dynamics.	12-1
1-2 Descriptive Geometry.	Surveying (lecture), 1, 2, 3, 4. Practical Chemistry, 5.	Drawing, Practical Chemistry, 2, 3, 5.	Field Work, *Physical Laboratory, 2, 5, (a).	Field Work, *Physical Laboratory, 2, 5, (a).	1-2
3-4 Drawing, Practical Chemistry, 1, 2, 3, 4, 5.	Field Work, Drawing, *Physical Laboratory, 2 (a).	Drawing, Practical Chemistry, 2, 3, 5.	Drawing, Field Work, *Physical Laboratory, 2, 5, (a).	Drawing, Field Work, *Physical Laboratory, 2, 5, (a).	3-4
4-5 Drawing, Practical Chemistry, 1, 2, 3, 4, 5.	Field Work, Drawing, *Physical Laboratory, 2 (a).	Drawing, Practical Chemistry, 2, 3, 5.	Drawing, Field Work, *Physical Laboratory, 2, 5, (a).	Drawing, Field Work, *Physical Laboratory, 2, 5, (a).	4-5

1, Civil Engineering; 2, Mechanical and Electrical Engineering; 3, Mining Engineering; 4, Architecture; 5, Analytical and Applied Chemistry.  
 \*University of Toronto. (a) First Term. (b) Second Term. Subjects not numbered are common to all the departments.



TIME TABLE—SECOND YEAR—SESSION 1892-3.

Hours.	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	Hours.
9-10	Strength of Materials, 1, 2, 3, 4.	Astronomy, 1, 3. Theory of Mechanism, 2. History of Architecture, 4.	Strength of Materials, 1, 2, 3, 4.	Astronomy, 1, 2. Theory of Mechanism, 2. Orders of Architecture, 4. Drawing, 1, 2, 4, (a).	Calculus.	9-10
10-11	Drawing, 1, (a). Electricity, 2, (a). Mining and Ore Dressing, 3, (a). Pen and Ink, 4, (a). Practical Mineralogy, 1, 2, 4, (b).	Drawing, 1, 2, 3, 4, (a). Hydrostatics, (b). Drawing.	Calculus.	Mining and Ore Dressing, 3, (a). Optics, (b). Descriptive Geometry, 1, 2, 3, 4.	Drawing, 1, 2, 4, (a). Electricity, 2, 3, (a).	10-11
11-12	Drawing, 1, 2, 3, 4.	Drawing.	Practical Chemistry.	Practical Chemistry.	Hydrostatics, (b). Drawing.	11-12
12-1	Practical Mineralogy, 1, 2, 3, 4.	Mineralogy and Geology, 1, 3, 4, 5.	Practical Chemistry.	Mineralogy and Geology, 1, 2, 3, 4.	Spherical Trigonometry, 1, 2, 3, 4. History of Ornament, 5.	12-1
1-2	Drawing, 1, 2, 3, 4.	Drawing.	Practical Chemistry.	Practical Chemistry.	Theory of Surveying Instruments, 1, 3, 4. Physical Laboratory, 2, 3, 4, (b).	1-2
2-3	Practical Mineralogy, 1, 2, 3, 4.	Applied Chemistry.	Rigid Dynamics, 1, 2, 3.	Applied Chemistry.	Theory of Surveying Instruments, 1, 3, 4. Physical Laboratory, 2, 3, 4, (b).	2-3
3-4	Practical Mineralogy, 1, 2, 3, 4.	Field Work, 1, 3, 4. Physical Laboratory, 1, 3, 4, (b). Drawing, 2.	Physical Laboratory, 2, 3, 4, (b). Drawing, 1, 3, 4.	Field Work, 1, 3, 4. Physical Laboratory, 1, 3, 4, (b). Drawing, 2.	Field Work, 1, 3, 4. Physical Laboratory, 2, 3, 4, (b).	3-4
4-5	Practical Mineralogy, 1, 2, 3, 4.	Field Work, 1, 3, 4. Physical Laboratory, 1, 3, 4, (b). Drawing.	Physical Laboratory, 2, 3, 4, (b). Drawing, 1, 3, 4.	Field Work, 1, 3, 4. Physical Laboratory, 1, 3, 4, (b). Drawing.	Field Work, 1, 3, 4. Physical Laboratory, 2, 3, 4, (b). Drawing.	4-5

1. Civil Engineering; 2. Mechanical and Electrical Engineering; 3. Mining Engineering; 4. Architecture; 5. Analytical and Applied Chemistry.  
 \*United States Government. (b) Subject to be determined by the department. (c) Subject to be determined by the department. In the department of Analytical and Applied Chemistry all hours not otherwise allotted are to be spent in the laboratories.

TIME TABLE—THIRD YEAR—SESSION OF 1892-3.

4-5	Practical Mineralogy, 1, 3, 4. Drawing, 1, 3, 4, (a). Electrical Laboratory, 2, 5.	Drawing, 1, 3, 4. Field Work, 1, 3, 4. Physical Laboratory, 2, 5, (a). Drawing, 1, 3, 4, (a).	Drawing, 1, 3, 4. Field Work, 1, 3, 4. Physical Laboratory, 2, 5, (a). Drawing, 1, 3, 4, (a).	4-5
-----	--	--	--	-----

1, Civil Engineering; 2, Mechanical and Electrical Engineering; 3, Mining Engineering; 4, Architecture; 5, Analytical and Applied Chemistry.  
 (a) Hours not allotted to all the departments. In the department of Analytical and Applied Chemistry all hours not otherwise allotted are to be spent in the laboratories.

TIME TABLE—THIRD YEAR—SESSION OF 1892-3.

Hour	Monday	Tuesday	Wednesday	Thursday	Friday	Hour
9-10	Theory of Compound Stress, 1, 2, 3, 4. Drawing, 1, 2, 3, 4.	Hydraulics, 1, 2, 3, 4. Drawing, 1, 2, 3, 4.	Descriptive Geometry, 1, 2, 3, 4. Drawing, 1, 2, 3, 4.	Hydraulics, 1, 2, 3, 4. Drawing, 1, 2, 3, 4.	Applied Chemistry, 2, 4. Drawing, 1, 3, 4.	9-10
10-11	Drawing, 1, 2, 3, 4.	Practical Astronomy, 1, 3, 4. Machine Design, 1, 2, 3, 4.	Drawing, 1, 2, 3, 4.	Drawing, 1, 2, 3, 4.	Practical Astronomy, 1, 3, 4.	10-11
11-12	Drawing, 1, 2, 3, 4.	Practical Mineralogy, 1, 3, 4. Drawing, 1, 2, 3, 4.	Drawing, 1, 2, 3, 4.	Drawing, 1, 2, 3, 4.	Drawing, 1, 2, 3, 4.	11-12
12-1	Applied Chemistry, 1, 3, 4. Metallurgy, 2, 5.	Practical Mineralogy, 1, 3, 4. Principles of Decoration, 2, 5.	Mineralogy and Geology, 1, 3, 4. Electricity, 2, 5.	Assaying, 1, 2, 3, 4. History of Architecture, 2, 5.	Mining and Ore Dressing, 3, 4. Mineralogy and Geology, 1, 3, 4. Mechanics of Machinery, 2, 5.	12-1
1-2	Constructive Design, 1, 3, 4. Physical Laboratory, 2, 5, (a).	Thermodynamics, 1, 2, 3, 4. Water Supply and Sewerage, 1, 4.	Constructive Design, 1, 3, 4. Drawing, 2, 5.	Thermodynamics, 1, 2, 3, 4. Water Supply and Sewerage, 1, 4.	Plumbing, Heating and Ventilation, 1, 4. Metallurgy, 2, 5, (a).	1-2
2-3	Drawing, 1, 2, 3, 4.	Field Work, 1, 4. Assaying, 1, 3, 4. Electrical Laboratory, 2, 5.	Drawing, 1, 2, 3, 4.	Field Work, 1, 4. Assaying, 1, 3, 4. History of Ornament, 2, 5.	Drawing, 1, 4. Field Work, 1, 4. Physical Laboratory, 2, 5, (a).	2-3
3-4	Drawing, 1, 2, 3, 4.	Field Work, 1, 4. Assaying, 1, 3, 4. Electrical Laboratory, 2, 5.	Drawing, 1, 2, 3, 4.	Field Work, 1, 4. Assaying, 1, 3, 4. History of Ornament, 2, 5.	Drawing, 1, 4. Field Work, 1, 4. Physical Laboratory, 2, 5, (a).	3-4
4-5	Drawing, 1, 2, 3, 4.	Field Work, 1, 4. Assaying, 1, 3, 4. Electrical Laboratory, 2, 5.	Drawing, 1, 2, 3, 4.	Field Work, 1, 4. Assaying, 1, 3, 4. History of Ornament, 2, 5.	Drawing, 1, 4. Field Work, 1, 4. Physical Laboratory, 2, 5, (a).	4-5

1, Civil Engineering; 2, Mechanical and Electrical Engineering; 3, Mining Engineering; 4, Architecture; 5, Analytical and Applied Chemistry.  
 (a) Hours not allotted to all the departments. In the department of Analytical and Applied Chemistry all hours not otherwise allotted are to be spent in the laboratories.

TIME TABLE—FOURTH OR POST-GRADUATE YEAR.

There is no regular time table for the work of this year. The time of the students is spent almost wholly in the engineering, chemical, and assaying laboratories. The hours will be from 9 a.m. to 5 p.m. every working day during the season. Lectures will be given at such intervals as may suit the laboratory work.

## Faculty of the School.

J. GALBRAITH, M. A., ASSOC. M. INST. C. E., PRINCIPAL.

### MEMBERS OF THE COUNCIL.

J. GALBRAITH, M.A., ASSOC. M. INST. C.E. *Professor of Engineering (Chairman)*  
 W. H. ELLIS, M.A., M.B. .... *Professor of Applied Chemistry.*  
 A. P. COLEMAN, M.A., PH. D. .... *Professor of Assaying and Metallurgy*  
 L. B. STEWART, F.L.S., D.T.S. .... *Lecturer in Surveying. (Secretary.)*  
 C. H. C. WRIGHT, GRAD. S.P.S. .... *Lecturer in Architecture.*  
 T. R. ROSEBRUGH, B.A., GRAD. S.P.S. .... *Lecturer in Electrical Engineering.*  
 CESARE J. MARANI, GRAD. S.P.S. .... *Lecturer in Sanitary Engineering.*

### ASSISTANT INSTRUCTORS.

J. A. DUFF, B.A., GRAD. S.P.S. .... *Fellow in Engineering.*  
 R. W. ROSS, M.A. .... *Fellow in Applied Chemistry.*  
 \* ..... *Fellow in Metallurgy and Assaying.*

### MEMBERS OF THE FACULTY OF THE UNIVERSITY OF TORONTO WHOSE CLASSES ARE ATTENDED BY THE REGULAR STUDENTS OF THE SCHOOL.

E. J. CHAPMAN, PH.D., LL.D. .... *Professor of Mineralogy and Geology.*  
 JAMES LOUDON, M.A. .... *Professor of Physics.*  
 R. RAMSAY WRIGHT, M.A., B.Sc. .... *Professor of Biology.*  
 W. H. PIKE, M.A., PH.D. .... *Professor of Chemistry.*  
 ALFRED BAKER, M.A. .... *Professor of Mathematics.*  
 W. J. LOUDON, B.A. .... *Demonstrator in Physics.*  
 A. B. McCALLUM, B.A., M.B., PH.D. .... *Lecturer in Physiology.*  
 W. L. MILLER, B.A., PH.D. .... *Demonstrator in Chemistry.*  
 R. HENDERSON, B.A. ....  
 J. F. HOWARD, B.A. .... *Fellows in Mathematics.*  
 C. A. CHANT, B.A. .... *Fellow in Physics.*  
 W. G. MILLER, B.A. .... *Fellow in Mineralogy and Geology.*  
 E. C. JEFFREY, B.A. .... *Fellow in Biology.*

For information further than that contained in the Calendar, application may be made to the Secretary, L. B. STEWART.

\*To be appointed before 1st October, 1892.

Scho

In the ses  
the establis  
in a memori  
tenant-Gov

By the sc  
ment with t  
School of Ph  
by its prof  
were embra

This arra  
departments  
University  
Act.

In order t  
advantage o  
University  
School to th  
Governor in

By an Or  
6th day of  
ment of the  
as chairman  
on the Teac



# School of Practical Science

PROVINCE OF ONTARIO.

---

## CALENDAR FOR THE SESSION 1892-93.

---

In the session of 1877 the Legislative Assembly gave its sanction to the establishment of a School of Practical Science on the basis proposed in a memorandum of the Minister of Education confirmed by the Lieutenant-Governor in Council on the 3rd day of February, 1877.

By the scheme thus approved of, the government effected an arrangement with the Council of University College whereby the students of the School of Practical Science enjoyed full advantage of the instruction given by its professors and lecturers in all the departments of science which were embraced in the work of the School.

This arrangement was brought to an end in 1889 by the transfer of the departments in science above referred to, from University College to the University of Toronto under the operation of the University Federation Act.

In order that the students of the School might continue to enjoy the advantage of the instruction in the above departments, the Senate of the University of Toronto passed a Statute in October, 1889, affiliating the School to the University, which Statute was confirmed by the Lieutenant-Governor in Council on the 30th day of October, 1889.

By an Order in Council, approved by the Lieutenant-Governor, on the 6th day of November, 1889, a Principal was appointed, and the management of the School was entrusted to a council composed of the Principal as chairman, and the Professors, Lecturers and Demonstrators appointed on the Teaching Faculty of the School.

There are five regular Departments of Instruction in each of which Diplomas are granted :—

1. Civil Engineering (including Sanitary Engineering).
2. Mechanical and Electrical Engineering.
3. Mining Engineering.
4. Architecture.
5. Analytical and Applied Chemistry.

The instruction given in each of these departments is designed to give the student a thorough knowledge of the scientific principles underlying the practice in the several professions, and also to give him such a training as will make him immediately useful when he enters into active professional work.

In order to afford an opportunity of taking full advantage of the engineering, chemical and assaying laboratories a fourth or post-graduate year has been established. In the regular three years course the laboratory and practical work is of such a nature that it can be successfully carried on in the intervals between lectures. All laboratory work which cannot be advantageously pursued in connection with a fixed time table for lectures has been reserved for the fourth year. The fourth year is thus essentially a laboratory year. Lectures are given in connection with the work as occasion requires. Graduates who fulfil the requirements of the fourth year are eligible for the degree of Bachelor of Applied Science (B.A.Sc.) University of Toronto. Graduates in the Department of Civil Engineering are also eligible for the degree of Civil Engineer (C.E.), University of Toronto, after three years of practical work.

each of which

REGULATIONS  
RESPECTING THE  
SCHOOL OF PRACTICAL SCIENCE.

*Approved by His Honour the Lieutenant-Governor in Council, the 14th  
day of June, 1892.*

1. The internal management and discipline of the School of Practical Science shall be vested in a Council (of which the Principal shall be Chairman) consisting of the Professors, Lecturers and Demonstrators appointed by the Lieutenant-Governor in Council on the staff of the School.
2. The Academic Year shall consist of two Terms, the First Term extending from 1st October to 23rd December, and the Second Term from 8th January to 1st May.
3. A Diploma shall be granted to each student who shall have completed to the satisfaction of the Council the Regular Course in any of the following five Departments :—
  - (1) Civil Engineering (including Sanitary Engineering).
  - (2) Mechanical and Electrical Engineering.
  - (3) Mining Engineering.
  - (4) Architecture.
  - (5) Analytical and Applied Chemistry.
4. The Regular Course for the Diploma of the School in each Department shall be three years.
5. Students may enter the Regular Course in any one of the above Departments either (a) by presenting certificates of having passed the Matriculation Examination in any University in Her Majesty's



Dominions or the High School Leaving Examination of the Province of Ontario. or (b) by presenting certificates of having had at least one year's experience in some recognized engineering, architectural or manufacturing work, and passing an examination in the following subjects :—

*Algebra*.—Elementary rules, easy factoring, highest common measure, lowest common multiple, square root, fractions, ratio, simple equations of one, two or three unknown quantities, indices, surds, quadratic equations of one and two unknown quantities.

*Euclid*—Books I, II, and III ; Deductions.

*English*—Dictation, Composition.

6. \* The Council shall have the power of dealing with special cases provided the candidates are sufficiently prepared to take their places in the classes.
7. Special students may be permitted to attend such lectures or courses of instruction, or of practical work, as the Council may think proper.
8. Certificates of attendance and standing, may be given upon due examination to special students, and such students shall not be required to pass an entrance examination.
9. At the end of the Academic Year, examinations will be held in the different subjects taught. Candidates for Diplomas and Certificates are required to enter for these.
10. All regular students shall be in attendance at the school during the whole of each term, unless exempted by special permission of the Council. The term will not be allowed to any student who has attended less than three-fourths of the required lectures and practical lessons, or who has been reported to the Council for bad conduct and adjudged guilty thereof.
11. Students of the School shall attend such courses of lectures at the University of Toronto as may be required of them by the Council.

\*The only examination held in the School of Practical Science for the purpose of testing qualification for entrance, is that mentioned in clause 5 (b). This examination will begin at 9 a.m. Wednesday, 28th September, 1892.

## FORM OF DIPLOMA.

THE

## SCHOOL OF PRACTICAL SCIENCE,

PROVINCE OF ONTARIO.

(ESTABLISHED 1878).

THIS IS TO CERTIFY *that*

.....  
 of the ..... in the .....  
 ..... has completed the Regular Course  
 of this School for the Diploma in the .....  
 extending over a period of three years, and comprising theoretical and practical instruction in the following subjects, viz. :

.....  
 .....  
 WHEREFORE the said .....  
 becomes duly entitled to receive this Diploma, having fulfilled to the satisfaction of the Faculty of the School all the requirements thereunto relating.

IN WITNESS whereof we have signed this Diploma at Toronto, in the Province of Ontario, this ..... day of .....  
 ..... One thousand eight hundred and .....  
 and have caused the seal of this School to be hereunto affixed.

L. S.]

.....Chairman.

.....Secretary.

## REGULAR COURSES FOR THE DIPLOMA.

See regulations, pp. 9 and 10.

The following are the Departments in which the Diploma is granted :—

- (1) Civil Engineering (including Sanitary Engineering).
- (2) Mechanical and Electrical Engineering.
- (3) Mining Engineering.
- (4) Architecture.
- (5) Analytical and Applied Chemistry.

### SESSIONAL AND OTHER FEES, DEPOSITS, ETC.

The sessional fees for instruction in any of the regular courses, are as follows .—

First Year : Thirty-four Dollars.

Second Year : Forty-four Dollars.

Third Year : Fifty-four Dollars.

These are payable in two equal instalments, one in each term. A discount of two dollars will be made on each instalment if paid before the end of the first month of the term in which it is due. There is no extra fee for the Diploma.

#### DEPOSITS.

General.....	\$2 00
Chemical laboratory .....	3 00
Mineralogical laboratory .....	7 00

#### DUES.

For maintenance of Physical Laboratory.

Departments.	I. Year.	II. Year.	III. Year.
	\$ c.	\$ c.	\$ c.
Civil and Mining Engineering.....		1 50	1 00
Mechanical and Electrical Engineering.....	1 00	1 50	3 00
Architecture .....		1 00	2 00

The discount on the instalment of sessional fees payable in the first term will not be allowed unless all deposits and other dues are paid at the same time.

ESTIM

Session  
Books,  
fee  
I. Year

Information  
dents on regis

Three fello  
one in Metall  
of the school.

Each fellow

The Fellow  
tion as may b

Application  
Secretary on

REGULAT  
PROV.

No candida  
and dues for

The minim  
examinations

The minim  
work connect  
minimum req

In order to  
nations are h



## ESTIMATED EXPENSES OF A REGULAR COURSE.

Sessional Fees .....	\$120 00
Books, instruments, drawing materials, laboratory fees, etc., about as follows—	
I. Year, \$30 ; II. Year, \$40 ; III. Year \$30.....	130 00
Total for Regular Course about .....	<u>\$250 00</u>

Information as to instruments and materials will be given to the students on registration at the beginning of the Session.

## FELLOWSHIPS.

Three fellowships, one in Engineering, one in Applied Chemistry, and one in Metallurgy and Assaying have been established, open to graduates of the school.

Each fellowship is of the value of \$500 per annum.

The Fellows are required to take such portions of the work of instruction as may be assigned to them by the Council.

Applications for these fellowships are to be made annually to the Secretary on or before the 20th day of September.

## REGULATIONS RESPECTING EXAMINATIONS APPROVED BY THE COUNCIL OF THE SCHOOL.

No candidate will be allowed his examination who has not paid all fees and dues for which he is liable.

The minimum percentage of marks required to pass in the written examinations will be fixed from time to time by the Council.

The minimum percentage of marks required to pass in the practical work connected with any subject shall be one and one-half times the minimum required in the case of a written examination.

In order to pass in subjects wherein both written and practical examinations are held, the candidate must pass in each examination.

In order to pass the practical examinations in the subjects of Applied Mechanics, Descriptive Geometry, Surveying and Architecture, the following minimum number of drawings must be made in the respective Years and Departments :—

SUBJECT.	CIVIL AND MINING ENGINEERING.			MECHANICAL AND ELECTRICAL ENGINEERING.			ARCHITECTURE.		
	I Year.	II Year.	III Year.	I Year.	II Year.	III Year.	I Year.	II Year.	III Year.
Applied Mechanics...	8	6	8	10	15	12	8	5	6
Descript. Geometry.	7	12	11	11	7	10	7	9	10
Surveying .....	6	4	4	0	0	0	2	0	0
Architecture .....	0	0	0	0	0	0	7	9	7

The above minimum number of drawings will include only such drawings as shall be specially prescribed for the purpose.

These drawings will be prescribed one by one as the work of the session proceeds.

Drawings prescribed for the first term of the session will not be counted unless finished in that term.

To pass in Drawing the above-mentioned minimum number of drawings must be made, together with as many practice sheets as may be prescribed.

The number of practice sheets to be made by each student will depend upon his progress.

The minimum percentage of marks prescribed for practical work must be obtained in Drawing.

The minimum number of drawings shall be 25 and the maximum number 35.

The drawings must be made on paper 15x22 inches, unless otherwise prescribed.

At the end of each term the drawings must be neatly bound together between covers of approved pattern before they are finally examined, and the student's name, together with his year, term, and date, must be neatly printed on said cover.

The Council reserve the right of disposing of the drawings as they may think proper. No drawing may be removed from the school without permission.

To pass in Surveying the minimum percentage required for practical work must be obtained in the field work.

No drawings will be counted which have not been made in the drafting rooms, and during the hours allotted to such work.

No field notes will be counted, which have not been taken in the field, and during the hours allotted to such work.

The penalties for the infringement of the above two rules will be determined in each case by the Council.

#### VACATION WORK.

Vacation work must be handed in during the first week of the ensuing session, otherwise it will not be counted.

Vacation notes must be on construction only, and consist of not less than 20, nor more than 30 pages. The sketches must be free-hand pencil drawings with figured dimensions.

Theses must be written on ordinary foolscap, and consist of not less than 20, nor more than 30 pages.

The minimum percentage of marks required for practical work must be made in the case of vacation notes and theses.

No notes, whether taken during the session or the vacation, will be counted unless made in the standard note books of the School.

Theses must be accompanied by carefully made drawings and illustrations separated from the text, and must be bound between flat covers.

The sketches for the second year thesis in the Architectural Course are to be made on one side of the sheet of a sketch book and mounted on cardboard or paper 15" x 22".

The Architectural students are advised to spend the vacation in an architect's office.



## SUPPLEMENTAL EXAMINATIONS.

A candidate below the standing of the third year, who has failed in one or two subjects, will be required to take supplemental examinations in such subjects.

In case a candidate has failed in both the written examination and the practical work in a subject, it will be necessary for him to obtain the minimum percentage required for practical work in the written examination, and to do such extra practical work during the ensuing session as may be prescribed.

Should his failure have been in only the practical work of a subject he will be required to take a supplemental written examination, and to do such extra practical work during the ensuing session as may be prescribed. If his failure has been in the written examination only, he will be required to take a written supplemental examination. In each of these latter cases the minimum percentage required for a written examination will be exacted.

The supplemental written examinations will begin on the first day of the session.

In the case where a candidate fails to pass a supplemental examinations it will count as one of the two supplemental examinations which may be allowed him after the next annual examination.

Candidates of the standing of the third year will not be allowed the privilege of a supplemental examination.

Candidates who fail in being promoted to a higher year will be required to take again the whole course of instruction, both theoretical and practical, of the year in which they failed, before presenting themselves a second time for examination.

No candidate will be allowed his examination if his written answers or thesis evince ignorance on his part of the ordinary rules of spelling and composition.

The fees to be paid by a student repeating a year, will be the regular fees for such year.

Students are required to spend the hours of every working day between nine a.m. and five p.m. at the work laid down in the time table.

No exemption from any of the foregoing regulations will be granted, unless under such exceptional circumstances as may be deemed sufficient by the Council, which must be fully set forth in a formal petition.

Throug  
of \$10.00  
of the A

DEPARTM  
E

Algebra  
Euclid.  
Plane T  
Analytic  
†History  
†Magnet

Calculu  
\*§Astron  
Optics.

\*Civil Eng  
§Mining E

## PRIZES.

Through the liberality of Mr. D. B. Dick, Architect, Toronto, a prize of \$10.00 in books will be open annually for competition in the first year of the Architectural Department.

## REGULAR EXAMINATIONS.

(Approximate List.)

DEPARTMENTS OF CIVIL ENGINEERING, MECHANICAL AND ELECTRICAL  
ENGINEERING, MINING ENGINEERING, AND ARCHITECTURE.

## I. Year.

Examinations held at end of Session.

Algebra.	Statics.
Euclid.	Dynamics.
Plane Trigonometry.	Descriptive Geometry.
Analytical Geometry.	Surveying.
†History of Architecture.	Chemistry, Elementary.
†Magnetism and Electricity.	†Electricity.

Examinations held during the Session.

Drawings.

\*§Field Notes.

Construction Notes.

†Experimental Physics.

Practical Chemistry.

## II. Year.

Examinations held at end of Session.

*Calculus.	Strength of Materials.
*§Astronomy.	*†§Rigid Dynamics.
Optics.	†Theory of Mechanism.
*Civil Engineering only.	†Mechanical and Electrical Engineering only.
§Mining Engineering only.	†Architecture only.

Hydrostatics.	Descriptive Geometry.
+Magnetism & Electricity.	‡+Surveying.
‡History of Architecture.	‡+Spherical Trigonometry.
‡Orders of Architecture.	‡+Mineralogy and Geology.
‡History of Ornament.	‡Electricity.
Chemistry, Theoretical.	‡Metallurgy.
Chemistry, Applied.	‡Mining.

## Examinations held during the Session.

Drawings.
‡Field Notes.
Construction Notes.
Experimental Physics.
Thesis (at beginning of Session).
Chemistry, Practical.
‡Mineralogy, Practical.

## III. Year.

## Examinations held at end of Session.

+Magnetism and Electricity.	Theory of Compound Stress.
‡History of Architecture.	‡+Theory of Construction.
‡History of Ornament.	‡Mechanics of Machinery.
‡Principles of Decoration.	‡Machine Design.
Method of Least Squares.	Hydraulics.
Chemistry, Applied.	‡+Thermodynamics.
‡+Mineralogy and Geology.	Descriptive Geometry.
‡+Water Supply and Sewerage.	‡+Practical Astronomy and Geodesy.
‡+Sanitary Plumbing, Heating and Ventilation.	‡+Surveying and Levelling.
Metallurgy.	
‡Mining and Ore Dressing.	

## Examinations held during the Session.

Drawings.
‡Field Notes.
Construction Notes.
Experimental Physics.
Thesis (at beginning of Session).
‡Mineralogy, Determinative.
‡Assaying.

*Civil Engineering only.	+Mechanical and Electrical Engineering only.
‡Mining Engineering only.	‡Architecture only.

This  
paration  
this ter

MATHE

MECHA

DRAW

SURVEY

CHEMIS

MATHE

PHYSIC



## I. DEPARTMENT OF CIVIL ENGINEERING.

*(Including Sanitary Engineering.)*

This Department is intended to afford the necessary preliminary preparation to students intending to become Civil Engineers (including under this term Sanitary Engineers).

### I. YEAR.

#### MATHEMATICS.

Euclid, Algebra, Plane Trigonometry, Analytical Plane Geometry.

#### MECHANICS.

Statics and Dynamics (with special reference to Structures and Machines).

#### DRAWING.

Copying from the flat. Lettering. Topography.

Original Surveys.

Graphics.

Descriptive Geometry in its application to plane sided solids, Orthographic (including Isometric) and Oblique Projection.

#### SURVEYING.

Field and Office Work—Chain and Compass Surveys—Topography—Preliminary instruction in the use of the Transit-Theodolite—Plotting, Mensuration.

#### CHEMISTRY.

Elementary Chemistry, with Laboratory Practice.

### II. YEAR.

#### MATHEMATICS.

Differential and Integral Calculus,

Spherical Trigonometry.

#### PHYSICS.

Hydrostatics.

Geometrical Optics.

Plane Astronomy.

**EXPERIMENTAL PHYSICS.**

Light : Use of lenses and mirrors. Calculation of focal lengths.  
The prism and spectroscope. Goniometer and heliostat.

**DRAWING.**

Subjects of First Year continued.  
Coloring and shading applied in both topographical and construction drawing.  
Descriptive Geometry in its application to solids bounded by curved surfaces. The various projections of the sphere and principles of map construction.  
Machines and Structures. (Drawings made from both copies and original notes).

**ENGINEERING AND SURVEYING.**

Statics and Dynamics. (Pure and applied).  
Strength and Elasticity of Materials.  
Experimental work in Engineering Laboratory.  
Transit-Theodolite Surveying.  
Levelling.  
Railway Location, Curves, etc.  
Hydrographic Surveying.

**CHEMISTRY.**

General Chemistry.  
Practical Chemistry.  
Chemistry (Applied).  
Combustion, Fuel, and Furnaces.  
Artificial Lighting.  
Photography.

**MINERALOGY AND GEOLOGY.**

Elements of these Sciences.  
Blowpipe Practice.  
Determination of Minerals.

**III. YEAR.****EXPERIMENTAL PHYSICS.**

Heat : Specific Heat. Latent Heat. Expansion of Air, Air Thermometer. Method of Least Squares.

**DRAWING.**

Subjects of previous years continued.

Descriptive Geometry.

Shades and Shadows.

Stone cutting.

Perspective Projection.

Original Designs—Bridges, Roofs, Floors, Arches, etc.

**ENGINEERING AND SURVEYING.**

Statics and Dynamics. (Pure and applied.)

Strength and Elasticity of Materials.

Theory of Construction.

Practical Designs.

Bridges, Roofs, Floors.

Arches, Retaining Walls.

Foundations, etc.

\*Thermodynamics and Theory of the Steam Engine.

Hydraulics.

\*Drainage, Sewerage, Water Supply, Sanitary Plumbing, Heating and Ventilation.

Experimental work in Engineering Laboratory.

Levelling.

Profiles, Cross-sections, Field work and Plotting.

Computation of quantities.

Mathematical Theory of Surveying Instruments.

Trigonometrical and Barometrical Levelling.

Geodesy (considering the earth's sphere).

Practical Astronomy (treated in the manner required for the P.L.S. and D.L.S. Examinations.)

**CHEMISTRY (APPLIED).**

Explosives.

Mortars and Cements.

Bricks and Artificial Stones.

Preservation of Wood, Iron and Stone.

†Water, Air and Sewage, with Laboratory work.

**METALLURGY.**

Metallurgy of Iron and Steel.

\*Only one of these subjects to be taken.

\* Civil Engineering only.

†Sanitary Engineering only.



## MINERALOGY AND GEOLOGY.

Economic Geology.

Blowpipe Analysis and Determinative Mineralogy.

## II. DEPARTMENT OF MECHANICAL AND ELECTRICAL ENGINEERING.

This Department is intended to afford the necessary preliminary preparation to students intending to become Mechanical and Electrical Engineers.

## I. YEAR.

## MATHEMATICS.

Euclid, Algebra, Plane Trigonometry.

Analytical Plane Geometry.

## MECHANICS.

Statics and Dynamics (with special reference to Structures and Machines).

## PHYSICS.

Magnetism and Electricity.

## EXPERIMENTAL PHYSICS.

Light : Use of Lenses and Mirrors.

Calculation of focal lengths.

The Prism and Spectroscope.

Goniometer and Heliostat.

## DRAWING.

Copying from the Flat, Lettering.

Graphics.

Descriptive Geometry in its application to plane sided solids.

Orthographic (including Isometric) and Oblique Projection.

## SURVEYING.

(Lectures only). Applications of Trigonometry and Principles of Measurement.

## CHEMISTRY.

Elementary Chemistry with Laboratory Practice.

## MATHEMATICS.

Di  
Sp

## PHYSICS.

H  
O  
E

## EXPERIMENTAL PHYSICS.

H  
E  
E

## DRAWING.

S  
C  
D

M

## ENGINEERING.

S  
T  
S  
M  
E

## CHEMISTRY.

T  
P  
A

## II. YEAR.

## MATHEMATICS.

Differential and Integral Calculus.  
Spherical Trigonometry.

## PHYSICS.

Hydrostatics.  
Optics.  
Electrical Measurements.

## EXPERIMENTAL PHYSICS.

Heat: Specific Heat. Latent Heat.  
Expansion of Air. Air Thermometer.  
Electricity and Magnetism :  
Calculation of Elements of Terrestrial Magnetism.  
Declination, Dip, and Horizontal Intensity.  
Tangent Galvanometer.  
Use of Voltmeter.  
Use of Deprez and Thomson Galvanometers.

## DRAWING.

Subjects of first year continued.  
Coloring and Shading applied in construction drawing.  
Descriptive Geometry in its application to solids bounded by curved surfaces. The various projections of the sphere.  
Machines and Structures. (Drawings made from both copies and original notes).

## ENGINEERING.

Statics and Dynamics (Pure and Applied).  
Theory of Mechanism.  
Strength and Elasticity of Materials.  
Materials and Construction.  
Methods and Processes.  
Experimental work in Engineering Laboratory.

## CHEMISTRY.

Theoretical Chemistry.  
Practical do  
Applied do  
Combustion, Fuel and Furnaces.  
Artificial Lighting,  
Photography.

## III. YEAR.

## EXPERIMENTAL PHYSICS.

Electric Light Photometry,  
 Ballistic Galvanometer.  
 Heating Effects of Currents.  
 Electrometer.  
 Method of Least Squares.

## DRAWING.

Subjects of previous years continued.  
 Descriptive Geometry :  
     Shades and Shadows.  
     Stone Cutting.  
     Perspective Projection.

## ORIGINAL DESIGNS.

Engine and Machine Design.

## ENGINEERING.

Subjects of previous years continued.  
 Applied Mechanics :  
     Mechanics of Machinery.  
     Machine Design.  
     Thermodynamics and Theory of the Steam Engine.  
     Hydraulics.

Electricity :  
     Dynamoes and Motors.  
 Application of principles to practical problems connected with  
 the design, construction and testing of various prime motors  
 and machines.  
 Experimental work in Engineering Laboratory.

## CHEMISTRY (APPLIED).

Explosives.  
 Preservation of Wood, Iron and Stone.

## METALLURGY.

Iron, Steel, Nickel, Copper, etc.

In addition  
 passing the  
 Mechanical  
 factory exam  
 in one of the  
 as machine  
 restriction  
 practical ex

## III. I

This Dep  
 ing to stud

## MATHEMATICS

E

## MECHANICS

S

## DRAWING.

C

O

G

D

## SURVEYING

F

## CHEMISTRY

E



In addition to taking the course of instruction in the School and passing the requisite examinations, a candidate for the diploma in Mechanical and Electrical Engineering will be required to present satisfactory evidence of having had at least one year's good practical experience in one of the principal occupations connected with mechanical work, such as machinist, pattern-maker, moulder, steam-engineer, etc. There is no restriction as to the place where the candidate may have gained such practical experience.

### III. DEPARTMENT OF MINING ENGINEERING.

This Department is designed to afford the necessary preliminary training to students intending to become Mining Engineers.

#### I. YEAR.

##### MATHEMATICS.

Euclid, Algebra, Plane Trigonometry, Analytical Plane Geometry.

##### MECHANICS.

Statics and Dynamics (with special reference to structures and machines).

##### DRAWING.

Copying from the flat. Lettering. Topography.  
Original Surveys.  
Graphics.  
Descriptive Geometry in its application to plane sided solids.  
Orthographic (including Isometric) and Oblique Projection.

##### SURVEYING.

Field and Office Work—Chain and Compass Surveys—Topography—Preliminary instruction in the use of the Transit-Theodolite—Plotting, Mensuration.

##### CHEMISTRY.

Elementary Chemistry, with Laboratory Practice.

## II. YEAR.

## MATHEMATICS.

Differential and Integral Calculus.  
Spherical Trigonometry.

## PHYSICS.

Hydrostatics.  
Geometrical Optics.  
Plane Astronomy.

## EXPERIMENTAL PHYSICS.

Light : Use of Lenses and Mirrors.  
Calculation of focal lengths.  
The Prism and Spectroscope.  
Goniometer and Heliostat.

## DRAWING.

Subjects of First Year continued.  
Coloring and shading applied in both topographical and construction drawing.  
Descriptive Geometry in its application to solids bounded by curved surfaces. The various projections of the sphere and principles of map construction.  
Machines and Structures. (Drawings made from both copies and original notes.)

## ENGINEERING AND SURVEYING.

Statics and Dynamics. (Pure and applied.)  
Strength and Elasticity of Materials.  
Experimental work in Engineering Laboratory.  
Transit-Theodolite Surveying.  
Levelling.  
Railway Location, curves, etc.  
Mining Surveying.

## CHEMISTRY.

General Chemistry.  
Practical Chemistry, including qualitative and quantitative analysis.  
Chemistry (Applied.)  
Combustion, Fuel, and Furnaces.  
Artificial lighting.  
Photography.

## MINERALOGY.

El  
B  
D

## METALLURGY.

Ir  
M

## EXPERIMENTAL.

H  
E  
M

## DRAWING.

St  
D

O

## ENGINEERING.

St  
St  
T  
P

T  
E  
E  
L  
P  
C  
M  
T  
G  
P

## MINERALOGY AND GEOLOGY.

Elements of these Sciences.  
 Blowpipe Practice.  
 Determination of Minerals.

## METALLURGY.

Iron and Steel.  
 Mining and Ore Dressing.

## III. YEAR.

## EXPERIMENTAL PHYSICS.

Heat: Specific Heat. Latent Heat.  
 Expansion of Air, Air Thermometer.  
 Method of Least Squares.

## DRAWING.

Subjects of previous years continued.  
 Descriptive Geometry.  
     Shades and Shadows.  
     Stone cutting.  
     Perspective Projection.  
 Original Designs—Bridges, Roofs, Floors, Arches, etc.

## ENGINEERING AND SURVEYING.

Statics and Dynamics. (Pure and applied.)  
 Strength and Elasticity of Materials.  
 Theory of Construction.  
 Practical Designs.  
     Bridges, Roofs, Floors,  
     Arches, Retaining Walls.  
     Foundations, etc.  
 Thermodynamics and Theory of the Steam Engine.  
 Hydraulics.  
 Experimental work in Engineering Laboratory.  
 Levelling.  
 Profiles, Cross-sections, field work and plotting.  
 Computation of quantities.  
 Mathematical Theory of Surveying Instruments.  
 Trigonometrical and Barometrical Levelling.  
 Geodesy (considering the earth a Sphere.)  
 Practical Astronomy (treated in the manner required for the  
     P.L.S. and D.L.S. Examinations.)



## CHEMISTRY (APPLIED.)

Explosives.  
Mortars and Cements.  
Bricks and Artificial Stones.  
Preservation of Wood, Iron and Stone.  
Qualitative and Quantitative analysis.

## MINERALOGY AND GEOLOGY.

Economic Geology.  
Palaeontology.  
Blowpipe Analysis and Determinative Mineralogy.  
Metallurgy of Gold, Silver, Nickel, Copper, etc.  
Mining and Ore Dressing continued.  
Assaying.

## IV. DEPARTMENT OF ARCHITECTURE.

This course is designed to afford the necessary preliminary training to students intending to become Architects.

## I. YEAR.

## MATHEMATICS.

Euclid, Algebra, Plane Trigonometry, Plane Analytical Geometry.

## MECHANICS.

Statics (with reference to Structures).  
Dynamics (preliminary to the study of Hydraulics).

## PHYSICS.

Acoustics.

## DRAWING.

Instrumental and Free-hand, Copying from the Flat, Lettering,  
Pen and Ink, Descriptive Geometry (Plane Surfaces).

## HISTORY OF ARCHITECTURE.

Egyptian, Assyrian and Persian.

## SURVEYING.

Principles, Chain Surveying, Mensuration.

## CHEMISTRY.

Elementary Chemistry with Laboratory Practice.

## MATHEMATICS.

Di

## PHYSICS.

H

## EXPERIMENTAL.

Li

Ca

Th

Go

Ac

## DRAWING.

Ir

D

## SURVEYING.

U

M

## MECHANICS.

S

S

M

E

## HISTORY OF ARCHITECTURE.

G

F

## ORDERS OF ARCHITECTURE.

## HISTORY OF ARCHITECTURE.

C

## II. YEAR.

## MATHEMATICS.

Differential and Integral Calculus.

## PHYSICS.

Hydrostatics, Optics.

## EXPERIMENTAL PHYSICS.

Light : Use of Lenses and Mirrors.

Calculation of Focal Lengths.

The Prism and Spectroscope.

Goniometer and Heliostat.

Acoustics : Laws of Vibrating Strings.

Determination of Pitch.

Velocity of Sound.

Electric Fork.

Chronograph.

## DRAWING.

Instrumental Drawing, Drawing from the Cast, Sketching in  
Water Color, Pen and Ink.

Descriptive Geometry (Curved Surfaces).

## SURVEYING.

Use of Transit and Level.

Mensuration.

## MECHANICS.

Statics (Pure and Applied.)

Strength and Elasticity of Materials.

Materials of Construction.

Experimental work in Engineering Laboratory.

## HISTORY OF ARCHITECTURE.

Greek and Roman.

Romanesque and Byzantine.

## ORDERS AND ELEMENTS OF ARCHITECTURE.

## HISTORY OF ORNAMENT.

Ancient.

Classic—Greek, Roman.

## CHEMISTRY.

General Chemistry.

Practical do

Applied do

Combustion, Fuels and Furnaces.

Artificial Lighting.

Photography.

## MINERALOGY AND GEOLOGY.

Elements.

## III YEAR.

## DRAWING.

Descriptive Geometry.

Shades and Shadows.

Perspective.

Stone Cutting.

Water Color Sketching.

Original Designs—Floors, Trusses, Arches, etc.

## SURVEYING.

Levelling, Setting out Excavation, Mensuration.

## EXPERIMENTAL PHYSICS.

Specific Heat, Latent Heat.

Expansion of Air, Air Thermometer.

Method of Least Squares.

## HISTORY OF ARCHITECTURE.

Gothic and Renaissance, with special reference to England.

## HISTORY OF ORNAMENT.

Early Christian, Gothic and Renaissance.

## PRINCIPLES OF DECORATION.

## CHEMISTRY (APPLIED).

Artificial Lighting, Photography, Mortars and Cements, Bricks,  
and Artificial Stone.

Preservation of Wood, Iron and Steel.

Water, Air, and Sewage.



## THEORY OF CONSTRUCTION.

## HYDRAULICS.

## SANITARY SCIENCE.

House Drainage and Plumbing, Ventilation and Heating.  
Experimental work in Engineering Laboratory.

## MINERALOGY AND GEOLOGY.

Economic Geology.

## V. DEPARTMENT OF ANALYTICAL AND APPLIED CHEMISTRY.

This Department is designed to afford the necessary preliminary training to students who intend to become chemists by profession, either as analytical chemists or industrial chemists, and also to furnish instruction in chemistry and its useful applications, to students of engineering and architecture, and to special students who may desire such instruction.

## I. YEAR.

## MATHEMATICS.

Euclid, Algebra, Plane Trigonometry, Plane Analytical Geometry.

## MECHANICS.

Statics and Dynamics.

## PHYSICS.

Magnetism and Electricity.

## EXPERIMENTAL PHYSICS.

Light : Use of Lenses and Mirrors.  
Calculation of Focal Lengths.  
The Prism and Spectroscope.  
Goniometer and Heliostat.

## DRAWING.

Copying, Lettering, Model drawing.  
Descriptive Geometry.

## MODERN LANGUAGES.

French.  
German.

## CHEMISTRY.

Inorganic Chemistry.  
Laboratory Work.

## II. YEAR.

## MATHEMATICS.

Differential and Integral Calculus.  
Spherical Trigonometry.

## PHYSICS.

Hydrostatics.  
Optics.  
Electrical Measurements.

## EXPERIMENTAL PHYSICS.

Heat : Specific Heat. Latent Heat. Expansion of Air, Air  
Thermometer.  
Electricity and Magnetism.  
Calculation of Elements of Terrestrial Magnetism.  
Declination, Dip and Horizontal Intensity.  
Tangent Galvanometer.  
Use of Voltmeter.  
Use of Deprez and Thomson Galvanometers.

## MODERN LANGUAGES.

French.  
German.

## MINERALOGY AND GEOLOGY.

Elementary Mineralogy and Blowpipe Practice.  
Physical Geography, Palaeontology and Geology.

## CHEMISTRY.

Organic Chemistry.  
Applied Chemistry.  
Laboratory work in Quantitative and Qualitative Analysis.

PHYSICS.

BIOLOGY.

PHYSIOLOGY.

MINERAL

CHEMISTRY.

In ord  
and also  
laboratori  
causes the  
decided to  
to be kno

The dip  
dates who  
an extra  
the requir  
qualifying  
The wor

CIVIL ENG  
T

G  
T

## III. YEAR.

## PHYSICS.

Thermodynamics.

Electrical Measurements.

Electric Light Photometry.

Ballistic Galvanometer.

Heating Effects of Currents.

Electrometer.

Method of Least Squares.

## BIOLOGY.

## PHYSIOLOGY.

## MINERALOGY AND GEOLOGY.

## CHEMISTRY.

Advanced Chemistry, Inorganic and Organic.

Applied Chemistry.

Laboratory work.

## THE FOURTH YEAR.

In order to provide advanced work in the various departments and also to enable students to carry on experimental work in the laboratories with less interruption from attendance at lectures and other causes than is possible in the ordinary three years course, it has been decided to establish a sessional course of instruction in each department to be known as the fourth year.

The diploma of the school will be given, as heretofore, to all candidates who fulfil the requirements of the ordinary three years course, and an extra certificate will be given to candidates who after having fulfilled the requirements of the three years course may succeed in properly qualifying themselves in the work of the fourth year.

The work for the Fourth Year Certificate is as follows :—

## CIVIL ENGINEERING.

The work in this Department is divided into two groups between which an option must be exercised.

## Group I.

The principal subjects of this group are

Method of Least Squares.

Theory of Observations.



Strength and Elasticity of Materials.  
 Mortars and Cements.  
 Hydraulics.  
 Thermodynamics.  
 Engineering Designs.

The work in connection with these subjects will be done principally in the engineering laboratory, which is supplied with various machines, apparatus, and instruments necessary for experimental investigation.

#### Group II.

The subjects of this group are :—

Method of Least Squares.  
 Theory of Observations.  
 Topographical Surveying with Transit, Stadia,  
 Micrometers, Plane Table, etc.  
 Practical Astronomy (extended to cover the D.T.S.  
 examinations with special reference to the theory  
 of astronomical instruments).  
 Advanced Geodesy.

In the basement of the school are laid out a 100 ft. and a 66 ft. standard of length arranged so that various conditions affecting the length of surveyors' chains and tapes may be thoroughly investigated. Candidates will be required to take part in such work.

The school is also equipped with some of the more important instruments used in spherical and geodetic surveying.

#### MECHANICAL AND ELECTRICAL ENGINEERING.

The subjects in this department are :—

Method of Least Squares.  
 Theory of Observations.  
 Strength and Elasticity of Materials.  
 Hydraulics.  
 Thermodynamics.  
 Electricity.  
 Engine and Machine Design.

A great part of the work in connection with the above subjects will be done in the engineering laboratory. The time of the candidates will be principally devoted to tests in connection with boilers, engines, dynamos and electric motors.

**MINING ENGINEERING.**

The subjects in this department are :—

Strength and Elasticity of Materials.  
 Hydraulics.  
 Thermodynamics.  
 Electricity.  
 Advanced Mineralogy, including Crystallography.  
 Microscopic Lithology.  
 Assaying and Mineral Analysis.  
 Metallurgy.

**ARCHITECTURE.**

The subjects in this department are :—

Water-color Sketching.  
 Perspective.  
 Stereotomy.  
 Hydraulics.  
 Strength and Elasticity of Materials.  
 History of Architecture.  
 Design.  
 Specifications.

The laboratory work will consist of tests of the strength and elasticity of wood, iron and steel and of a course in cement and mortar testing.

**ANALYTICAL AND APPLIED CHEMISTRY.**

Students of the fourth year may select either of the following courses :

- (a) Industrial Chemistry :  
 With Laboratory work in General and Technical Analysis.
- (b) Sanitary and Forensic Chemistry :  
 With Laboratory practice in Toxicology, and the Analysis of Food, Water and Air.
- (c) Inorganic and Organic Chemistry.

Graduates of the University of Toronto in the department of Chemistry and Mineralogy will be admitted to the Fourth Year in Analytical and Applied Chemistry and Mining and Metallurgy.

In all departments the candidates will be required to show a good working acquaintance with translation from either French or German. This will be tested by their ability to translate extracts from scientific works or periodicals not previously specified.

Courses of reading in connection with subjects of study will be indicated in each Department.

The fee for the Fourth Year is \$54.00, subject to the conditions as to discounts, etc., stated on page 12.

#### DEGREE OF B. A. Sc.

Candidates who have fulfilled the requirements of the Fourth Year in the School of Practical Science are eligible for the degree of Bachelor of Applied Science in the University of Toronto in accordance with the following statute passed by the Senate in 1892.

BY THE SENATE OF THE UNIVERSITY OF TORONTO.

*Be it enacted :*

That the degree of Bachelor of Applied Science (B. A. Sc.) be hereby established to be granted subject to the following conditions and regulations :—

1. Candidates for the said degree shall hold the diploma of the School of Practical Science in any one of the regular courses of the said School, or shall be of the standing of the fourth year in the Honor Department of Chemistry and Mineralogy in the University of Toronto.
2. They shall have fulfilled the conditions relating to the Fourth or Post-Graduate Year in the School of Practical Science and shall present certificates of having done so to the Registrar of the University.
3. Each candidate shall prepare a Thesis based on the results of his Fourth Year work in the said School of Practical Science for the approval of the University examiners. This thesis is to be accompanied by all necessary drawings, specifications, tables and estimates.

4. Candidates will be required to pass such written and oral examinations as may be prescribed by the University Examiners in any two of the following subjects :—

Method of Least Squares and Theory of Observations.

Practical Astronomy.

Geodesy.

Strength and Elasticity of Materials.

Hydraulics.

Thermodynamics and Theory of Heat Engines.

Electricity and Magnetism.

Industrial Chemistry.

Sanitary and Forensic Chemistry.

5. Car

6. The

7. The

8. The

9. The

10. In

D  
Course  
ments o  
Survey  
certifica  
the said  
proper  
otherwi

Extract

"12.  
Ontario  
surveyin  
has ther  
passed  
the stu  
liminar  
ship wi  
land su



Inorganic and Organic Chemistry.  
 Mineralogy and Geology.  
 Metallurgy and Assaying.  
 History of Architecture.

5. Candidates shall notify the Registrar of their intention to proceed to the degree of B.A.Sc. not later than the first day of April.
6. The examination for the degree shall be held in May.
7. The fee for the degree shall be ten dollars and shall be paid to the Registrar not later than the first day of May.
8. The ordinary time for conferring the degree shall be at the University commencement in June. The degree may be conferred at any meeting of the Senate.
9. The thesis, drawings, and other papers accompanying them, shall be the property of the University.
10. In case any change be made in the conditions referred to in the second clause, such change shall be submitted to the Senate and shall have no force so far as the said clause is concerned unless approved by resolution of the Senate.

#### DOMINION AND PROVINCIAL LAND SURVEYORS.

Courses of instruction will be given in accordance with the requirements of the Statutes relating to the Dominion and Provincial Land Surveyors, which will enable the students, who, after examination, obtain certificates therein and who have otherwise fulfilled the provisions of the said Statutes, to present themselves for final examination before the proper Boards, at an earlier period in their apprenticeship than would otherwise be permitted.

#### *Extracts from the Provincial Act respecting Land Surveyors and Survey of Lands.*

"12. (2) Any person who has followed a regular course of study at the Ontario School of Practical Science in the subjects of drawing, surveying and levelling, and geodesy and practical astronomy, and who has thereupon received, after due examination, a certificate of having passed one session, two sessions, or three sessions, as the case may be, in the study, of the aforesaid subjects, may, after having passed the preliminary examination hereinbefore required for admission to apprenticeship with a land surveyor, be received as an apprentice by any practising land surveyor, and shall thereupon, if he has received a certificate of

having passed three sessions in the study of the said subjects, be only holden to serve as such apprentice during twelve successive months of actual service; or, in case he has received a certificate of having passed only one or two sessions, as the case may be, in the study of the said subjects, then, for such time of actual service as, with the period spent by him at such session or sessions, suffices to make up the full term of three years.

"(3) After such actual service, such person shall, subject to the other provisions of this Act, have the same right to present himself for and to undergo the examination required by law, and if found qualified, then to be admitted to practice as a land surveyor, as if he had served the full three years' apprenticeship otherwise required by law.

"14. The privilege of a shortened term of apprenticeship shall also be accorded to any graduate of the Military College at Kingston and of the Ontario School of Practical Science, and such person shall not be required to pass the preliminary examination hereinbefore required for admission to apprenticeship with a land surveyor, but shall only be bounden to serve under articles with a practising land surveyor duly filed as required by section 17 of this Act, during twelve successive months of actual practice, after which, on complying with all the other requirements, he may undergo the examination by this Act prescribed.

*Extract from the Dominion Lands Act.*

"Every graduate in surveying of the Royal Military College of Canada, and every person who has followed a regular course of study in all the branches of education required by this Act for admission as a Dominion Land Surveyor, through the regular sessions, for at least two years in any College or University where a complete course of theoretical and practical instruction in surveying is organized, and who has thereupon received from such College or University a Diploma as Civil Engineer, shall be exempt from serving three years as aforesaid, and shall be entitled to examination after one year's service under articles with a Dominion Land Surveyor, at least six months of which service has been in the field, on producing the affidavit required by the next preceding clause as to such service; but it shall rest with the board to decide whether the course of instruction in such College or University is that required by this clause.

The attention of the Candidates for the Diploma of D. T. S., given by the Dominion Board of Examiners, is directed to the facilities afforded for preparation in the School.

The a  
directed  
of Toron

Be it en

I. Tha  
I

11. Tha  
to

1. Can  
F

2. Can  
I

3. Can  
n

4. Sati  
d

5. It sh  
u

6. Eacl  
or

7. The  
th

8. Cand  
to

9. The  
an

10. The  
th

11. The  
R

12. The  
be

## DEGREE OF C. E.

The attention of regular students in the Civil Engineering course is directed to the following Statute, passed by the Senate of the University of Toronto in 1884 :—

BY THE SENATE OF THE UNIVERSITY OF TORONTO.

*Be it enacted :*

- I. That all previous Statutes of the University relating to Degrees or Diplomas in Civil Engineering, be hereby repealed.
- II. That the degree of C.E. be hereby established, to be granted subject to the following conditions and regulations :—
  1. Candidates for the said degree shall hold the Diploma in Civil Engineering of the Ontario School of Practical Science.
  2. Candidates shall have spent three years after receiving the said Diploma in the actual practice of the profession of Civil Engineering.
  3. Candidates shall have spent at least two years of the said period in the construction and operation of engineering works, as distinguished from surveys merely.
  4. Satisfactory evidence shall be offered as to the periods spent on the different classes of engineering employment, and intervals during which the candidate was not engaged in the construction or operation of engineering works, or in the prosecution of surveys, shall not be included as portions of the aforesaid period of three years.
  5. It shall not be necessary that the several intervals required to make up the period of three years be consecutive.
  6. Each candidate shall prepare for the approval of the Senate, an original essay on some engineering subject, accompanied with detailed explanations, drawings, specifications and estimates ; he shall also be examined on the subject of the essay as well as on the work or works on which he has been engaged, unless exempted therefrom on the special recommendation of the examiners.
  7. The subject of the said essay shall be forwarded to the Registrar for the approval of the Senate not later than the first day of February.
  8. Candidates shall notify the Registrar of their intention of proceeding to the degree of C.E., not later than the first day of April.
  9. The evidence required in section 4, together with the essay, drawings and estimates, shall be sent to the Registrar not later than the first day of May.
  10. The examination of the essay, drawings and estimates and any further examination of the candidate that may be considered necessary, may be held in May.
  11. The fee for the degree of C.E. shall be \$20, and shall be paid to the Registrar not later than the first day of May.
  12. The essay, drawings and estimates submitted by the candidate, shall be the property of the University.




## Synopsis of the Courses of Lectures AND PRACTICAL INSTRUCTION GIVEN IN EACH DEPARTMENT.

### WITH FEES FOR SPECIAL STUDENTS.

*The same discount for prompt payment will be allowed as in the case of regular students. See p. 12.*

*Special students are advised to enter at the beginning of the session (October 1st), as many subjects begun in the first term are continued through the second, and lectures cannot be repeated.*

(Reductions will be made to special students taking several courses.)

 Text-books for the first year marked (a) ; for second year (b) ; for third year (c), and for fourth year (d).

### DRAWING.

Model Drawing, Machines and Structures, Map and Topographical Drawing, Designs and Estimates, Graphical Calculations.

Descriptive Geometry, including Practical Geometry (Plane and Solid) ; Orthographic, Oblique and Perspective Projections ; Intersections of Surfaces, Shades and Shadows, Stone Cutting, Theory of Mechanism, Theory of Mapping, etc.

*Text-Books and Books of Reference.*—Davidson's Projections.

Angel's Plane and Solid Geometry.

Binn's Orthographic Projection.

Millar's Descriptive Geometry, (a),

(b).

Warren's Stone Cutting (c).

McCord's Lessons in Mechanical Drawing.

Worthen's Topographical Drawing,

(a), (b), (c).

Fees for Special Students, \$14.

## SURVEYING AND LEVELLING.

## LAND SURVEYING.

Chain Surveys.  
Compass and Theodolite Surveys.  
Methods of keeping Field Notes.  
Determination of Heights and Distances.  
Plotting.

## LEVELLING.

Longitudinal and Cross Sections.  
Plotting.

## SETTING OUT.

Setting out Straight Lines and Curves.  
Setting out Levels.

## MENSURATION.

Lines, Surfaces and Solids.  
Timber, Masonry, Iron and Earthwork.  
Capacities of Reservoirs, etc.

Lectures will also be given on the distinctive features of Mining and Hydrographic Surveying.

*Text-Books.*—Murray's Manual of Land Surveying (a).  
Gillespie's Higher Surveying (b), (c), (d).  
Henck's or Trautwine's Railway Curves (b), (c).  
Johnson's Theory and Practice of Surveying.

Fees for Special Students, \$14.

## PRACTICAL ASTRONOMY AND GEODESY.

## ORDINARY COURSE.

The work included in this course is sufficient to fulfil the requirements of the final examinations for Provincial and Dominion land surveyors.

In astronomy the principal subjects are the determination of time, latitude and azimuth, and the general principles of the methods of determining longitudes. Practical instruction is given in the methods of taking observations.

In geodesy all surveys, computations and methods of map construction are based upon the supposition that the earth is a sphere.

#### ADVANCED COURSE (FOURTH YEAR).

The work in this course is intended to fulfil the requirements of the final examination for Dominion topographical surveyors. It is distinguished from the work in the ordinary course not so much by the subjects as by the degree of refinement to which the investigations are carried.

In geodesy the earth is considered as a spheroid.

*Text-Books.*—Gillespie's Higher Surveying (b), (c).

Greene's Spherical and Practical Astronomy (c), (d).

Chauvenet's Spherical and Practical Astronomy.

Gore's Elements of Geodesy (c), (d).

Nautical Almanac, 1893 (c), (d).

Fee for Special Students, \$19.

### APPLIED MECHANICS.

#### STATICS.

The calculation of the stresses in framed structures, solid and riveted beams, arches, etc. Both graphical and analytical methods used.

#### THEORY OF THE STRENGTH AND ELASTICITY OF MATERIALS.

#### THEORY OF COMPOUND STRESS.

DESIGNING OF STRUCTURES in timber, iron and masonry—arches, retaining walls, foundations, roofs, bridges, etc.

#### DYNAMICS.

Representation and measurements of forces and motions.

Principles of *work* and *energy*.

Efficiency of machines. Friction.

Transmission of energy—belts, shafts, crank and connecting rod, etc.

Fly-wheels, governors.

Balancing of machinery, etc., etc.



## STRENGTH OF THE PARTS OF MACHINES.

## MACHINE DESIGN—

## HYDRAULICS—

Discharge of water through orifices, notches, etc. Flow in pipes and open channels. Water power. Water wheels, turbines, pumps, etc.

## THERMO-DYNAMICS AND THEORY OF THE STEAM ENGINE.

*Text Books and Books of Reference.*—Von Ott—Graphic Statics (a).

Du Bois—Graphic Statics.

“ Strains in Framed Structures.

Cotterill—Applied Mechanics (a), (b), (c), (d).

Rankine—Applied Mechanics (b), (c), (d).

Unwin—Elements of Machine Design (c).

Shann — Elementary Treatise on Heat (c), (d).

Kennedy—Mechanics of Machinery (b), (c).

Merriman—Hydraulics (c), (d).

Jackson—Hydraulic Manual.

Gerhard—House Drainage and Sanitary Plumbing (c).

Santo Crimp — Sewage Disposal Works.

Fees for Special Students, \$19.

## THEORY OF MECHANISM.

Principles of the transmission of motion without reference to force.

Pitch surfaces, spur wheels, bevel wheels, skew-bevel wheels, trains of wheelwork, teeth of wheels, cams, cranks, eccentrics, links, bands and pulleys, hydraulic connections, frictional gearing, link motion for slide valves, etc., etc.

- Text-Books and Books of Reference.*—Rankine—Machinery and Millwork.  
 Camus—Teeth of Wheels.  
 MacCord—Slide Valve and Eccentric.  
 Goodeve—Elements of Mechanism (b).  
 Kennedy—Mechanics of Machinery (b), (c).  
 Cotterill—Applied Mechanics (b), (c), (d).

Fee for Special Students, \$19.

## ELECTRICITY.

Instruction will be given in this subject by laboratory work in the laboratories both of the School and of the University of Toronto, as well as by courses of lectures partly in the School and partly in the University. The work will comprise :—

### ELEMENTARY ELECTRICITY AND MAGNETISM.

#### MEASURING INSTRUMENTS—

Theory and uses in determining current, electromotive force, resistance, capacity, strength of field, magnetic induction, etc., etc.

### MATHEMATICAL THEORY OF ELECTRICITY.

#### APPLICATIONS OF ELECTRICITY—

Laboratory work and lectures on telegraph, telephone, dynamos, their design and construction, electric lighting; arc and incandescent systems, storage batteries, transmission of power by electricity, etc.

### THEORY OF ALTERNATING CURRENT GENERATORS AND TRANSFORMERS.

- Text-Books and Books of Reference.*—Kennelly & Wilkinson—Practical Notes for Electrical Students (a), (b).  
 Stewart & Gee—Practical Physics (b).

- Cumming—Theory of Electricity (c).  
 Thomson, S. P.—Dynamo Electric Machinery (c), (d).  
 Kapp—Electric Transmission of Energy (d).  
 Blakesley—Alternating Currents (d).  
 Current numbers of the "Electrician," the "Electrical World," and "La Lumiere Electrique."

Fee for Special Students, from \$19 to \$34.

## ARCHITECTURE.

### HISTORY OF ARCHITECTURE—

Egyptian, Assyrian and Persian.  
 Classic.  
 Romanesque and Byzantine.  
 Gothic.  
 Renaissance.

### ORDERS OF ARCHITECTURE.

### HISTORY OF ORNAMENT.

### PRINCIPLES OF DECORATION.

- Text-Books and Books of Reference.*—T. Roger Smith—Classic and Early Christian Architecture (a), (b).  
 T. Roger Smith—Gothic and Renaissance (c).  
 Fergusson's History of Architecture.  
 Gwilt's Encyclopædia of Architecture.  
 Vignole—The Five Orders of Architecture (b), (c).  
 Leed's Orders of Architecture (b).  
 Owen Jones—Grammar of Ornament.  
 Racinet—L'Ornement Polychrome.

Fee for Special Students, \$19.



## MATHEMATICS.

The Pure Mathematics included in this course will be taught in the University of Toronto.

The Applied Mathematics will be taught partly in the University and partly in the School.

## CHEMISTRY.

All the instruction in this subject is given in the School of Practical Science.

COURSES BY THE PROFESSOR OF CHEMISTRY OF THE UNIVERSITY OF TORONTO.

Inorganic Chemistry.  
Organic Chemistry.  
Historical Development of Chemical Theory.  
Physical Chemistry.

COURSES BY THE PROFESSOR OF APPLIED CHEMISTRY OF THE SCHOOL OF PRACTICAL SCIENCE.

Elementary Chemistry.  
Applied Chemistry.  
The Chemistry of Combustion, Fuel, Furnace, Artificial Lighting,  
Explosives, Photography, Building Materials, Water, Air  
and Sewage, Chemical Manufactures.  
Laboratory Work, including Technical Analysis, the Analysis  
Food, Water and Air, and Toxicology.

Fee for Special Students, \$34 to \$54.

## MINERALOGY AND GEOLOGY.

MINERALOGY, GEOLOGY, MINING AND METALLURGY.

## 1. Mineralogy and Geology—

Mineralogy and Crystallography.  
Geology and Paleontology.  
Lithology.  
Physical Geography.  
Blowpipe Analysis.  
Determinative Mineralogy.

Book

2. Mining

A subject  
will be re  
fications

The en  
make, du  
that may

The va  
into acco  
tion.

4

*Books of Reference.*—Chapman's Mineralogy and Geology of Canada.

Dana's Manual of Geology.  
 Dana's System of Mineralogy.  
 Nicholson's Palaeontology.  
 Geikie's Text-Book of Geology.  
 Plattner's Manual of Blowpipe Analysis.  
 Chapman's or Brush's Mineral Tables.

## 2. Mining and Metallurgy—

Mining Geology.  
 Ore Dressing.  
 Metallurgy of Iron and Steel.  
 Metallurgy of Nickel, Copper, Silver, etc.  
 Assaying.

Köhler's Bergbaukunde.  
 Kuhnhardt's Ore Dressing.  
 Phillip's Ore Deposits.  
 Balling's Metallhuettenkunde.  
 Schnabel's Allgemeine Huettenkunde.  
 Phillip's and Bauerman's Elements of Metallurgy.  
 Mitchell's Assaying by Crookes.  
 Kerl's Probirkunst.

Fee for Special Students, \$19 to \$54.

## VACATION WORK.

## THESIS AND CONSTRUCTION NOTES.

A subject will be given at the end of each session on which the student will be required to write a thesis (accompanied by drawings and specifications when necessary) during the subsequent vacation.

The engineering and architecture students will also be required to make, during the vacation, full and clear notes of various constructions that may fall under their notice.

The value of both the thesis and the construction notes will be taken into account in determining his standing at the next following examination.

## CIVIL ENGINEERING.

*Subject of Thesis for Second Year.*—Roads, Streets and Pavements.

“ “ *Third* “ Sanitary Drainage.

*Books of Reference.*—Gilmore—Roads, Streets and Pavements.

Waring—Sanitary Drainage of Houses and Towns.

Latham—Sanitary Engineering.

## MECHANICAL AND ELECTRICAL ENGINEERING.

*Subject of Thesis for Second Year.*—Machine-shop Practice.

“ “ *Third* “ Foundry Practice.

*Books of Reference.*—Rose—Practical Machinist.

West—American Foundry Practice.

Spretson—Casting and Founding.

## ARCHITECTURE.

For the second year the following set of freehand pencil sketches will be required:—

I. Doorway from the object;

II. Staircase “ “

III. Arched bridge (stone) from the object;

And seven sheets from the object, prints or drawings, with plans and sections where possible.

*Subject of the Thesis for the Second Year.*—The above sketches.

“ “ *Third* “ Sanitary Drainage.

*Books of Reference for Third Year.*—Waring—Sanitary Drainage of Houses and Towns.

Latham—Sanitary Engineering.

Any other works on the above subjects may be consulted and results of original observations should be given.

## ENGINEERING LABORATORY.

This Laboratory occupies two floors, having a total area of 10,000 square feet. It consists of three departments, viz.:

(a) The department for testing materials of construction.

(b) The department for investigating the principles governing the applications of power. This department is sub-divided into the steam laboratory, the hydraulic laboratory and the electrical laboratory.



(c) The department for investigating problems connected with standards of length, time, astronomical observations, etc.

In order to prepare specimens for the testing machines, a shop has been fitted up with a number of high-class machine tools specially suited for reducing the specimens to the requisite shapes and dimensions with a minimum of hand labor. It is also supplied with the necessary appliances for making ordinary repairs.

The machines in the department for testing materials are the following :—

An Emery 50-ton machine, built by Wm. Sellers & Co., of Philadelphia, for making tests in tension and compression.

A Riehle 100-ton machine for making tests in tension, compression, shearing and cross-breaking. It will take in posts twelve feet long and beams up to eighteen feet in length.

An Olsen torsion machine for testing the strength and elasticity of shafting. This machine will twist shafts up to sixteen feet in length and two inches in diameter.

A Riehle 2,000 pounds cement testing machine. The cement testing room is fitted with all the usual accessories.

The equipment of the power department is as follows :—

A Babcock & Wilcox 52-horsepower boiler.

A Harrison Wharton 12-horsepower boiler.

A 50-horsepower Brown engine. This engine was constructed specially for experimental investigation. It is steam jacketed and has three alternative exhausts, to the open air, to a jet condenser, and to a Wheeler surface condenser, kindly presented to the School by Mr. F. M. Wheeler of New York, the inventor.

There are also a Blake circulating pump, a Knowles air pump and a Blake feed pump, the latter of which was a gift from the manufacturers.

A machine for testing lubricating oils and measuring journal friction, built by Riehle Bros., of Philadelphia.

The hydraulic division of the laboratory is furnished with a three-throw pump with double acting cylinders. It has a capacity of 500,000 gallons per 24 hours. There are also large tanks furnished with orifices and weirs, measuring tanks, etc. A three feet jet turbine forms a part of the same equipment.

The electrical division of the laboratory is equipped with the following dynamos :—

Edison, Ball, Thomson-Houston, two Gülcher machines, a Westinghouse alternator with transformers, a Crocker-Wheeler and a Kay motor, also two small fan motors.

There are also a Roberts storage battery, a gravity primary battery and a good equipment of lamps, arc and incandescent, of different types.

The power department is equipped with the usual measuring instruments, indicators, gauges, gauge testing apparatus, scales, brakes, dynamometers, a variety of electrical measuring apparatus, including a Thomson electrical balance.

The shafting is driven by a 7-horsepower Otto gas engine, and by the Brown engine above described.

In the geodetic and astronomical department are a 100 feet and a 66 feet standard of length ; a 10 foot Rogers comparator with graduating attachment ; a Howard astronomical clock and electro-chronograph ; a Troughton & Simms 10 inch theodolite and all the ordinary surveying instruments.

---

#### THE CHEMICAL LABORATORIES.

The chemical laboratories comprise a laboratory for qualitative analysis with accommodation for 40 students working at one time, a laboratory for quantitative analysis capable of accommodating 20 students and smaller rooms for special work such as water analysis, technical gas analysis, etc. The laboratories are fitted with the usual appliances.

---

#### BLOWPIPE AND ASSAYING LABORATORIES.

Six rooms are provided in this department, including a blowpipe laboratory with tables and other appliances for fifteen students ; an assaying laboratory with gas and charcoal furnaces ; a balance room, titration laboratory and store-rooms, with the equipment necessary for wet and dry assays.

---

#### PHYSICAL LABORATORY.

(UNIVERSITY OF TORONTO).

The Physical Laboratory in connection with the University of Toronto is furnished with a large collection of apparatus for lecture experiments in the departments of mechanics, sound, light, heat and electricity. It is also well supplied with instruments of precision for individual work

primary battery  
different types.  
asuring instru-  
s, brakes, dyna-  
luding a Thom-

ne, and by the

0 feet and a 66  
with graduating  
o-chronograph ;  
dinary survey-

qualitative ana-  
me, a laboratory  
0 students and  
i, technical gas  
appliances.

RIES.

ing a blowpipe  
n students ; an  
balance room,  
it necessary for

rsity of Toronto  
ure experiments  
and electricity,  
individual work

in the same departments. In addition to an elementary laboratory, there are several special laboratories, which offer unusual facilities for the conduct of experiments in the various branches of physics.

The electrical apparatus includes electrometers, galvanometers, resistance coils and bridges, testing keys, batteries, electrical machines (Holz and Carre), Ruhmkorff coils, Crooke's tubes, telephones, etc. etc.

#### MODERN LANGUAGES.

No special examinations are held in these languages except in the Fourth Year, but it is expected that every student of a regular course should be able to acquaint himself with the contents of any of the works necessary to his profession, written in these languages. Such books may be prescribed for the terminal examinations.

#### LIBRARIES, MUSEUMS, ETC.

The Library, Museums and Herbarium of the University of Toronto are open to regular students. The library fee is \$2 per annum, payable in advance.

#### SOCIETIES.

##### THE ENGINEERING SOCIETY OF THE SCHOOL OF PRACTICAL SCIENCE.

###### OFFICERS FOR 1891-92.

<i>President</i> .....	R. W. Thomson.
<i>Vice-Presidents</i> .....	T. R. Deacon, A. T. Laing.
<i>Secretary</i> .....	J. Keele.
<i>Treasurer</i> .....	W. A. Bucke.
<i>Corresponding Secretary</i> .....	W. A. Lea.
<i>Librarian</i> .....	A. V. White.
<i>Representatives—Graduates</i> .....	J. A. Duff, B.A., Grad. S.P.S.
Third Year.....	J. B. Goodwin.
Second Year.....	A. J. McPherson.
First Year.....	A. T. Fraser.

The Society meets every second Tuesday during the Academic Year. Papers are read and discussions are held on engineering subjects. The Society subscribes for the leading engineering journals for the use of the students, and publishes a pamphlet annually, containing the best papers read before the Society.

Membership fee, \$1 per annum.



# ALUMNI ASSOCIATION OF THE SCHOOL OF PRACTICAL SCIENCE.

## OFFICERS FOR 1892.

*President*.....J. Galbraith, M.A., Assoc. M. Inst. C.E.  
*First Vice-President*....J. McAree, D.T.S.  
*Second Vice-President*..J. L. Morris, C.E.  
*Councillors*.....E. B. Hermon, D.L.S.  
                                 J. McDougall, B.A.  
                                 G. Mickle, B.A.  
                                 G. H. Richardson.  
                                 T. K. Thomson, C.E.  
*Secretary-Treasurer* ....J. A. Duff, B.A.

Graduates are requested to keep the Secretary acquainted with their addresses.

Abre  
 Ada  
 Bosv  
 Bur  
 Berg  
 Blac  
 Burt  
 Chal  
 Dral  
 Dobi  
 Fitz

Arda  
 Bark  
 Brov  
 Char  
 Dun  
 Fran  
 Fair  
 Hinc  
 Jone

Alisc  
 Ande  
 Fairc  
 Good  
 Lasc

## SESSION 1891-2.

## STUDENTS IN ATTENDANCE.

## REGULAR STUDENTS.

## DEPARTMENT OF CIVIL ENGINEERING.

*1st Year.*

Abrey, G. S.	Fraser, A. T.	McTaggart, A. L.
Adams, J. C.	Fee, L.	Poussett, H. R.
Boswell, E. J.	Gibson, H. H.	Pruyn, D. B.
Burrell, H. S.	Greene, F. T.	Robinson, F. J.
Bergey, A. E.	Gordon, J. P.	Sims, H. B.
Black, C. A.	Hewett, C. H.	Shields, J. D.
Burton, T.	Herald, W. J.	Self, Geo.
Chalmers, J.	Johnson, S. M.	Topp, C. H.
Drake, H. D.	Johnson, Geo.	Tye, A. T.
Dobie, J. S.	Moore, H. H.	Wallbridge, C. M.
Fitzsimons, H.	Matthews, M. E.	Watson, J.

*2nd Year.*

Ardagh, J. A. G.	Laidlaw, J. T.	Russel, R.
Barker, H. F.	McPherson, A. J.	Rolph, H.
Brown, G. L.	McFarlen, T. J.	Speller, F. N.
Charlesworth, L. C.	Mines, W.	Squire, R. H.
Dunn, T. H.	Main, W. F.	Smith, A. D.
Francis, W. J.	McAllister, A. L.	Taylor, W. V.
Fairbairn, J. M.	Marani, V. G.	Watson, A.
Hinde, E. W.	Macallum, A. F.	Watson, R. B.
Jones, J. E.		

*3rd Year.*

Alison, T. H.	Laing, A. T.	Prentice, J. M.
Anderson, A. G.	McEntee, B.	Ross, J. A.
Fairchild, C.	Mitchell, C. H.	Smith, Albert.
Goodwin, J. B.	Playfair, N. L.	Thomson, R. W.
Laschinger, E. J.		

# DEPARTMENT OF MECHANICAL AND ELECTRICAL ENGINEERING.

*1st Year.*

Angus, R. W.  
Black, R. G.  
Boyd, D. G.  
Blachford, W. A.  
Beauregard, A. T.  
Brown, R. M.  
Doyle, F. M.

Filion, S. B.  
Jeffrey, J. R.  
Johnston, A. C.  
Lash, N. M.  
Livingstone, H. K.  
Minty, W.  
Nicholson, C. J.

Ridout, C.  
Stocking, F. T.  
Spotton, A. K.  
Tremaine, R. C. C.  
Wood, H. T.  
Wickson, F. R.  
Wright, R. T.

*2nd Year.*

Buoke, W. A.  
Goldie, A. R.  
Hanly, J. B.

Hanly, S. C.  
Lash, F. L.

Robertson, J. M.  
Robertson, C. G.

*3rd Year.*

Lea, W. A.

Milne, C. G.

White, A. V.

# DEPARTMENT OF ARCHITECTURE.

*1st Year.*

Ewart, J. A.  
Langley, F. W.

Michie, H. S.  
Williams, R. E.

Walker, J.

*2nd Year.*

Ballantyne, H. F.

Fingland, W.

Keele, J.

*3rd Year.*

Langley, C. E.

# DEPARTMENT OF ANALYTICAL AND APPLIED CHEMISTRY.

*1st Year.*

Hagarty, H. J.

*3rd Year.*

Lawson, W.

*4th Year.*

James, O. S.



## SPECIAL STUDENTS.

## MECHANICAL ENGINEERING.

## 1st Year.

Gordon, B.

Harvey, J. A.

McCollum, H.

## 2nd Year.

Carroll, J. H.

## ARCHITECTURE.

## 1st Year.

Clarke, J. T.  
Heward, S. A.Murray, D. B.  
Ross, A. J.

Smith, S. F.

## DRAWING AND MATHEMATICS.

## 1st Year.

Phippen, J. B.

## ANALYTICAL AND APPLIED CHEMISTRY.

## 1st Year.

Breithaupt, A. L.

Emery, E. J.

## METALLURGY AND ASSAYING.

Bucke, M. A., Grad. S.P.S.	Gibson, T. W.	Symmes, H. D., Grad. S.
English, A. B., Grad. S.P.S.	McColl, A. B.	P.S.

## PRIZEMEN.

## ENGINEERING.

1879.—	I. Year	J. McAree	1st prize.
1880.—	II. Year	J. L. Morris	1st prize.
1881.—	I. Year	G. H. Duggan	1st prize.
	II. Year	D. Jeffrey	1st prize.
1882.—	I. Year	A. R. Raymer	1st prize.
	" "	E. W. Stern	2nd prize.
	II. Year	G. H. Duggan	1st prize.
	III. Year	D. Jeffrey	1st prize.
1883.—	I. Year	B. A. Ludgate	1st prize.
	" "	A. M. Bowman	2nd prize.
	II. Year	A. R. Raymer	1st prize.
	" "	E. W. Stern	2nd prize.
	III. Year	G. H. Duggan	1st prize.
1884.—	II. Year	B. A. Ludgate	1st prize.
	III. Year	E. W. Stern	1st prize.
	" "	A. R. Raymer	2nd prize.
1885.—	I. Year	A. E. Lott	1st prize.
	" "	J. Roger	2nd prize.
	II. Year	T. K. Thomson	1st prize.
	III. Year	B. A. Ludgate	1st prize.
1886.—	I. Year	C. H. C. Wright	1st prize.
	" "	J. E. Ross	2nd prize.
	II. Year	A. E. Lott	1st prize.
1887.—	I. Year	H. E. T. Haultain	1st prize.
	II. Year	C. H. C. Wright	1st prize.
	III. Year	A. E. Lott	1st prize.
	" "	J. Roger	2nd prize.
1888.—	I. Year	E. B. Merrill	1st prize.
	" "	F. M. Bowman	2nd prize.
	II. Year	D. D. James	1st prize.
	III. Year	C. H. C. Wright	1st prize.

1889.—

1890.—

1891.—

Date of

1889.—	I. Year.....	J. K. Robinson .....	1st prize.
	" "	G. E. Silvester .....	2nd prize.
	II. Year.....	E. B. Merrill .....	1st prize.
	" "	F. M. Bowman .....	2nd prize.
	III. Year.....	D. D. James .....	1st prize.

1890.—	I. Year.....	C. Fairchild .....	1st prize.
	II. Year.....	J. K. Robinson .....	1st prize.
	III. Year.....	F. M. Bowman .....	1st prize.
	" "	E. B. Merrill .....	2nd prize.

1891.—	I. Year.....	A. J. McPherson .....	1st prize.
	" "	R. B. Watson .....	2nd prize.
	II. Year.....	J. B. Goodwin .....	1st prize.
	III. Year.....	G. E. Silvester .....	1st prize.
	" "	C. W. Dill .....	2nd prize.

#### ARCHITECTURE.

I. Year.....	H. Ballantyne.
--------------	----------------

#### UNIVERSITY OF TORONTO.

#### DEGREE OF C. E.

#### Date of Admission.

1885.....	J. L. Morris.
1886.....	J. H. Kennedy.
1889.....	J. W. Tyrrell.
1892.....	T. K. Thomson.
1892.....	H. J. Chewett.



## GRADUATES.

NOTE.—Graduates are requested to inform the Secretary of changes in their addresses.

## CIVIL ENGINEERING.

- 1881.—Morris, J. L., C.E., P.L.S.,  
Pembroke, Ont.
- 1882.—Jeffrey, D., Contractor,  
Stratford, Ont.  
Kennedy, J. H., C.E., P.L.S., Architect, etc.,  
Shedden, Ont.  
McAree, J., P.L.S., D.T.S.,  
Toronto.
- 1883.—Burns, D., P.L.S.,  
49 Washington Street, Allegheny, Pa.  
Dugan, G. H.,  
Chief Engineer, Dominion Bridge Co., Montreal.  
Tyrrell, J. W., C.E., P. and D.L.S.,  
Hamilton, Ont.
- 1884.—Kirkland, W. C.,  
McDougall, J., B.A.,  
Raymer, A. R.,  
Engineer's Office, Lake Shore and Michigan Southern R. R.,  
Toledo, O.  
Robertson, J., P.L.S.,  
Coad & Robertson, Civil Engineers, P. L. Surveyors, etc.,  
Glencoe, Ont.  
Stern, E. W.,  
Engineer Architectural Iron Co., St. Louis, Mo.
- 1885.—Bleakley, F. W.,  
Seattle, W. T.  
Bowman, H. J., P. and D.L.S.,  
Berlin, Ont.  
Henderson, E. E., P.L.S.,  
Canadian Pacific R. R., Brownville, Maine.  
Ludgate, B. A., P.L.S.,  
Peterboro', Ont.  
McKay, O., P.L.S.,  
Windsor, Ont.

1886.—Bo

He

La

Th

Ty

1887.—Bu

Lo

Mc

Me

Pi

Ro

1888.—Ap

As

Ba

Br

Ca

Ch

Gil

Mc

Mc

Ma

Mi

Mo

Ric

Ro

Ro

Wr

- 1886.—Bowman, A. M., P. and D L.S.,  
Toronto Technical School.  
Hermon, E. B., P. and D.L.S.,  
Vancouver, B. C.  
Laird, R., P.L.S.,  
City Surveyor's Office.  
Thomson, T. K., C. E.  
Supt. of Bridges for C. M. Jacobs, C.E., 192 Broadway, N.Y.  
Tyrrell, H. G.,  
Pencoyd Bfidge and Construction Co., Penn.
- 1887.—Burns, J. C. (Deceased).  
Lott, A. E.,  
Atcheson, Topeka and Santa Fe R. R., Topeka, Kansas.  
McCullough, A. L., P.L.S.,  
Engineer's Office, West Toronto Junction.  
Martin, F., P.L.S.,  
Toronto, Ont.  
Pinhey, C. H., P. and D.L.S.,  
630 Wellington Street, Ottawa.  
Roger, J., P.L.S.,  
544 Lafayette Avenue, St. Paul, Minn.
- 1888.—Apsey, J. F., P.L.S.,  
242 W. Biddle St., Baltimore, Md., U.S.  
Ashbridge, W. T.,  
City Engineer's Office, Toronto.  
Ball, E. F.,  
Medical Health Office, Toronto.  
Brown, D. B., P.L.S.,  
Mexican Southern Railway, Old Mexico.  
Canniff, C. M.,  
City Surveyor's Office, Toronto.  
Chewett, H. J., A. M. (an. Soc. C. E., C. E.  
Willis Chipman, C.E., 103 Bay Street, Toronto.  
Gibbons, J., P.L.S.,  
Renfrew, Ont.  
McDowall, R., P.L.S.,  
Owen Sound, Ont.  
McFarlen, G. W., P.L.S.,  
County Surveyor's Office, Toronto.  
Marani, C. J.,  
Lecturer in Sanitary Engineering, S.P.S., Toronto.  
Mickle, G. R., B.A.,  
Mining Engineer, Toronto.  
Moore, J. H., P.L.S.,  
Newmarket, Ont.  
Richardson, G. H.,  
Niagara Falls and River R. R.  
Rose, K.,  
Mexican Southern Railway, Old Mexico.  
Ross, J. E., P.L.S.,  
Riverside, Cal.  
Wright, C. H. C.,  
Lecturer in Architecture, S.P.S., Toronto.

changes

R. R.,

rs, etc.,

- 1889.—Carey, B.,  
Engineer's Office, Toronto. 30 Russell Street.  
Chalmers, W. J.,  
Railway Construction Work, Cedar Lake, Michigan.  
Clement, W. A.,  
City Engineer's Office, Toronto.  
Hanning, G. F.,  
City Engineer's Office, Toronto.  
Haultain, H. E. T.,  
Anglo-American Club, Freiberg, Germany.  
Irvine, J.,  
Harriston, Ont.  
James, D. D.,  
Toronto University.  
Mill, F. X.,  
Engineer's Office, Brockville.  
Moberly, H. K.,  
Frostburg, Va., U.S.A.  
Rosebrugh, T. R., B.A.,  
Lecturer in Electrical Engineering, S.P.S., Toronto.  
Wickett, T.,  
Toronto University.

- 1890.—Bowman, F. M.,  
Pennsylvania Steel Co'y, Steelton, Pa.  
Bucke, M. A.,  
Geological Survey, Ottawa.  
Corrigan, G. D.,  
Union Pacific Railway, Seattle, W. T.  
Duff, J. A., B.A.,  
Fellow in Engineering, S. P. S., Toronto.  
English, A. B.,  
106 Gould Street, Toronto.  
Garland, N. L.,  
Eglinton, Ont.  
Hutcheon, J., P.L.S.,  
C. H. Keefer, C.E., Toronto.  
Innes, W. L.,  
C. P. R. Eng. Office, London, Ont.  
Merrill, E. B.,  
Toronto Technical School.  
Pedder, J. R., P.L.S.,  
J. Galt, C.E., Toronto.  
Wiggins, T. H., P.L.S.,  
Collingwood, Ont.  
Withrow, W. J.,  
Fetherstonhaugh & Co., Toronto.

1891.—

1890.—

1891.—

1890.—

1891.—



- 1891.—Beatty, H. J.,  
Pembroke, Ont.  
Deacon, T. R.,  
Surveyor's Office, North Bay, Ont.  
Dill, C. W.,  
Engineer's Office, Brockville, Ont.  
Lane, A.,  
Engineer's Office, West Toronto Junction.  
McAllister, J. E.,  
Canadian Bridge Co., Montreal, P. Q.  
Moore, J. E. A.,  
C. P. R., Islington, Ont.  
Newman, W.,  
Surveyor's Office, Leamington, Ont.  
Robinson, J. K., Deceased.  
Russel, W.,  
Railway Construction, Newfoundland.  
Silvester, G. E.,  
Surveyor's Office, Sudbury, Ont.  
Symmes, H. D.,  
Chignecto Ship Railway, N.S.

#### MECHANICAL AND ELECTRICAL ENGINEERING.

- 1890.—Ross, R. A.,  
Edison Electric Co., Peterboro', Ont.  
1891.—Merrill, E. B.  
Toronto Technical School.

#### ANALYTICAL AND APPLIED CHEMISTRY.

- 1890.—Boustead, W. E., B.A.Sc.  
Toronto.  
1891.—James, O. S.,  
S. P. S., Toronto, Ont.