

[Frontispiece.]

SCHOOL OF PRACTICAL SCIENCE, TORONTO.

CALENDAR

OF THE

School of Practical Science,

PROVINCE OF ONTARIO,

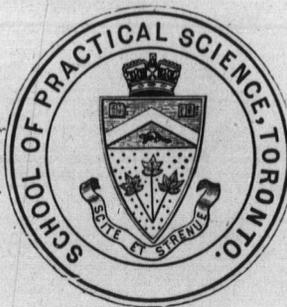
WITH A

SYLLABUS

OF THE

*Courses of Instruction and the Regulations for  
Diplomas.*

17th SESSION



1894-1895.

TORONTO:

PRINTED BY WARWICK BROS. & RUTTER, 68 AND 70 FRONT STREET, WEST.  
1894.

SCHOOL OF PRACTICAL SCIENCE, TORONTO.



# CONTENTS.

	PAGE.
Frontispiece .....	4
Calendar .....	5
Plans .....	13
Time-Tables .....	16
Faculty .....	17
General Description .....	19
Order-in-Council .....	21
Admission .....	22
Form of Diploma .....	23
Regular Courses .....	23
Fees, Deposits, etc. ....	24
Estimated Expenses of a Regular Course .....	25
Fellowships .....	26
Regulations .....	28, 62
Vacation Work .....	28
Supplemental Examinations .....	29
Prizes and Honors .....	30
Regular Examinations .....	32
Department of Civil Engineering .....	35
— Mining Engineering .....	38
— Mechanical and Electrical Engineering .....	41
— Architecture .....	45
— Analytical and Applied Chemistry .....	47
Fourth or Post Graduate Year .....	49
Degree of B. A. Sc. ....	51
Act respecting Dominion and Ontario Land Surveyors .....	53
Ontario Architects' Act .....	53
Degree of C. E. ....	55
Synopsis of Courses of Lectures, Fees for Special Students, etc. ....	64
Engineering Laboratory .....	65
Chemical .....	66
Assaying .....	66
Physical .....	66
Modern Languages .....	66
Library, Museums, etc .....	66
Societies .....	67
Students in Attendance .....	69
Prizemen .....	72
Graduates of School of Practical Science .....	74
University Graduates in Civil Engineering .....	81
University Graduates in Applied Science .....	81

**1894.**

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

21. Meeting of Council.  
 26. Entrance Examinations begin.

1. FIRST TERM begins.  
 2. Supplemental Examinations begin.  
 12. Meeting of Council.

9. Meeting of Council.

**1895.**

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

14. Meeting of Council.  
 21. FIRST TERM ends.

8. SECOND TERM begins.  
 11. Meeting of Council.

8. Meeting of Council.  
 27. Ash Wednesday.  
 Building closed.

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

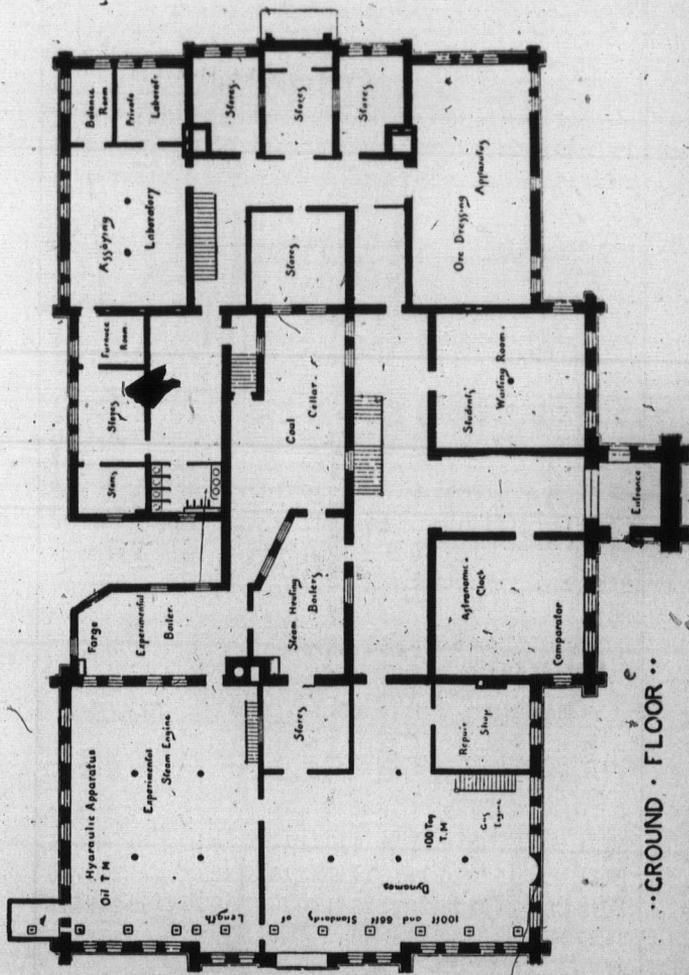
8. Meeting of Council.

8. Lectures and Practical Work close.  
 11. Meeting of Council.  
 12. Good Friday. Bldg. closed.  
 15. Examinations begin.

1. SECOND TERM ends.

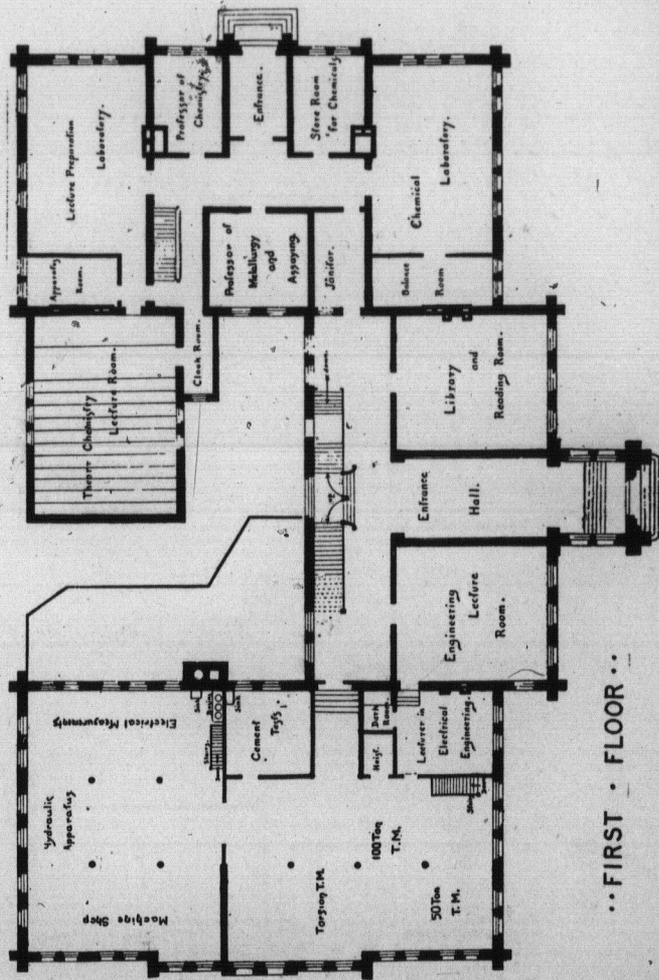
Black figures denote meetings of Engineering Society.

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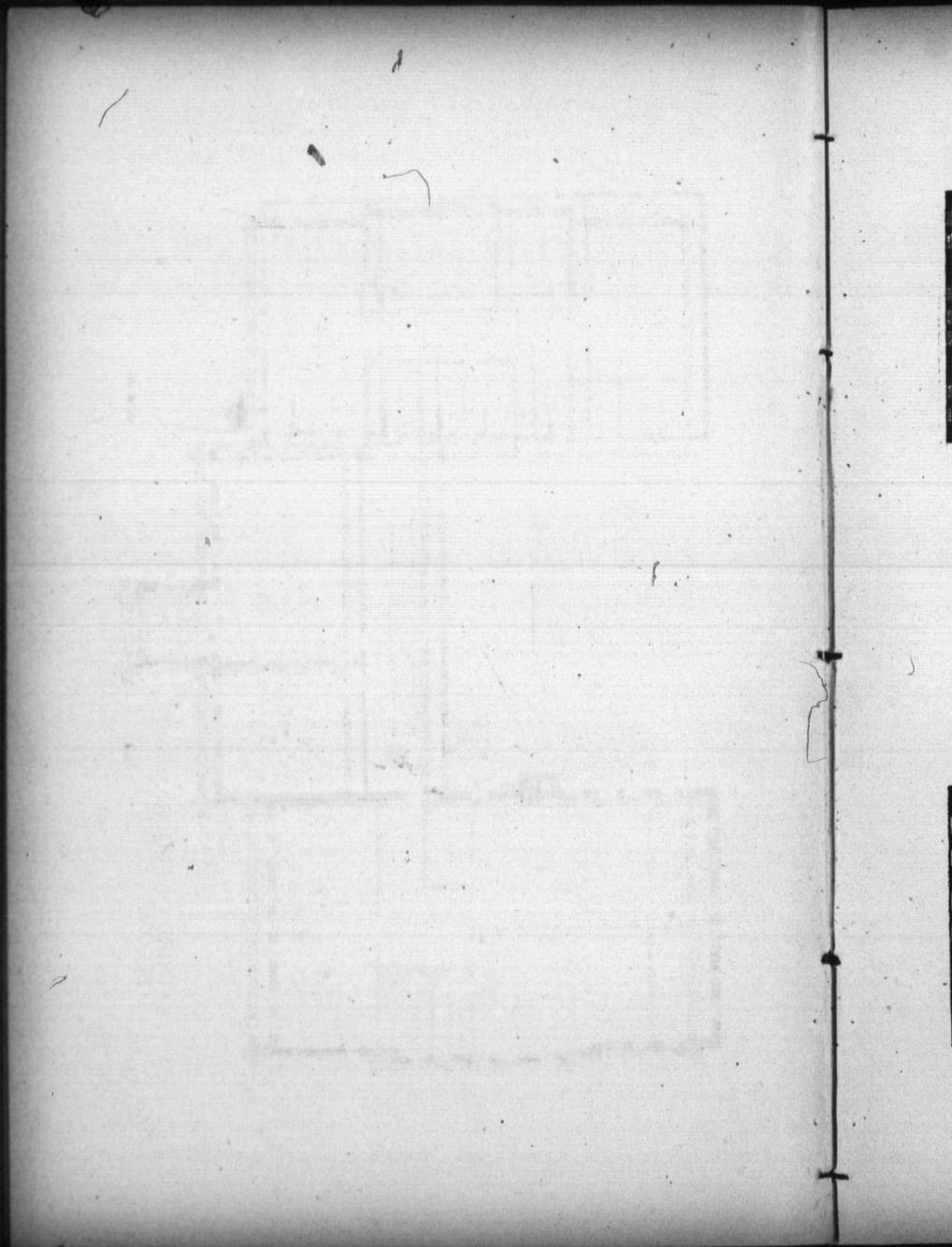


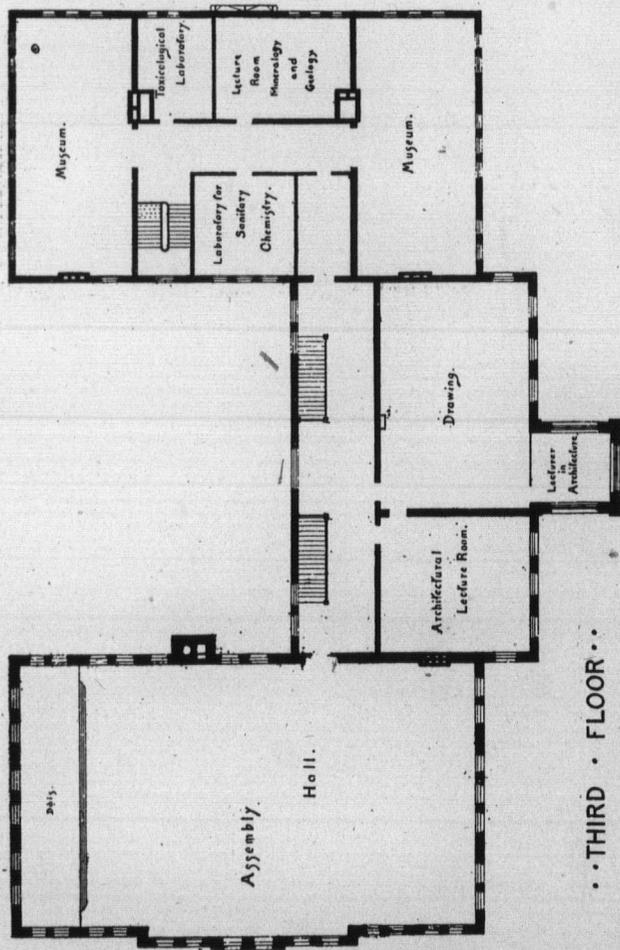
..FIRST FLOOR..



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••THIRD • FLOOR••



TIME TABLE—FIRST YEAR—SESSION 1894-95.

Hours.	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	Hours.
9-10	2 Analytical Geometry, 1, 2, 3, 4 Chemical Lab'y.	* Euclid.	* Trigonometry.	* Algebra.	* Trigonometry.	9-10
10-11	* Elect'y & Magn'm, 3, 5 (a) Drawing, 1, 2, 3, 5 (b) do	* Hie'm't'y Mechanics, 5 (a) Statics, 1, 2, 3, 5 (b) Drawing, 1, 2, 3, 5 (b)	* Acoustics, 4 (a) Arch'te, 3, 5 (b) Electricity, 1, 2 do * Chemistry, 3, 5 (a)	* Elementary Mechanics, 5 (a) Statics, 1, 2, 3, 5 (b) Drawing, 1, 2, 3, 5 (b)	* Elect'y & Magn'm, 3, 5 (a) Electricity, 1, 2, 3, 5 (b) History of Arch'te, 4 Drawing, 1, 2	10-11
11-12	Drawing.	* Chemistry.	* Chemistry.	* Chemistry.	Pen and Ink Drawing, 1, 2, 3, 5	11-12
12-1	Drawing.	> Dynamics, 1, 2, 3, 4 Drawing, 1, 2, 3, 4, 5	> Descriptive Geometry.	> Surveying, 1, 2, 3, 4 Drawing, 1, 2, 3, 4, 5	Drawing.	12-1
1-2						1-2
2-3	Chemical Lab'y. Drawing.	* Physical Lab'y, 3, 5 (a) Field Work, 1, 2, 4 (a) Chemical Lab'y, 5 (b) Drawing, 1, 2, 3, 4 (b)	Chemical Lab'y. Drawing.	* Physical Lab'y, 3, 5 (a) Field Work, 1, 2, 4 (a) Chemical Lab'y, 5 (b) Drawing, 1, 2, 3, 4 (b)	Chemical Lab'y, 5 Field Work, 1, 2, 4 (a) Drawing, 1, 2, 4 (b) do	2-3
3-4	Chemical Lab'y. Drawing.	* Physical Lab'y, 3, 5 (a) Field Work, 1, 2, 4 (a) Chemical Lab'y, 5 (b) Drawing, 1, 2, 3, 4 (b)	Chemical Lab'y. Drawing.	* Physical Lab'y, 3, 5 (a) Field Work, 1, 2, 4 (a) Chemical Lab'y, 5 (b) Drawing, 1, 2, 3, 4 (b)	Chemical Lab'y, 5 Field Work, 1, 2, 4 (a) Drawing, 1, 2, 4 (b) do	3-4
4-5	Chemical Lab'y. Drawing.	* Physical Lab'y, 3, 5 (a) Field Work, 1, 2, 4 (a) Chemical Lab'y, 5 (b) Drawing, 1, 2, 3, 4 (b)	Chemical Lab'y. Drawing.	* Physical Lab'y, 3, 5 (a) Field Work, 1, 2, 4 (a) Chemical Lab'y, 5 (b) Drawing, 1, 2, 3, 4 (b)	Chemical Lab'y, 5 Field Work, 1, 2, 4 (a) Drawing, 1, 2, 4 (b) do	4-5

1. Civil Engineering; 2. Mining Engineering; 3. Mechanical and Electrical 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. In the department of Analytical and Applied Chemistry all hours not otherwise allotted are to be spent in the laboratories.

TIME TABLE—SECOND YEAR—SESSION 1894-95.

Hours	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	Hours
9-10	Rigid Dynamics 1, 2, 3 History of Arch <sup>5</sup> , 4	Surveying (Lect.) 1, 2, 4 Electricity, 3	* Calculus, 1, 2, 3, 4	* Astronomy, 1, 2 Electricity, 3 History of Ornament, 4	* Calculus, 1, 2, 3, 4	9-10
10-10	* Optics. Spherical Trig'y 1, 2, 3 (a) Drawing, 4 (a)	* Hydrostatics. Heat, 5 (b) Mechanics, 6 (a)	Descriptive Geo 1, 2, 3, 4	* Hydrostatics. Heat, 5 (b) Mechanics, 6 (a)	* Optics. Spherical Trig'y, 1, 2, 3 (a) Drawing, 4 (a)	10-11
11-12	* Inorganic Chemistry 5 Mineralogy & Geology, 4, 5 Theory of Mechanism, 3	Chemical Lab'y. Drawing.	Mineralogy and Geology, 1, 2, 4, 5 Theory of Mechanism, 3	Drawing, 1, 2, 4 Electrical Lab'y, 3	* Inorganic Chem'y, 5 Pen and Ink, 1, 2, 3 Drawing.	11-12
12-1	Strength of Materials, 1, 2, 3, 4.	Chemical Lab'y. Drawing.	Strength of Materials, 1, 2, 3, 4	Drawing, 1, 2, 4 Electrical Lab'y, 3	Drawing, 1, 2, 3, 4	12-1
1-2	Mineralogical Lab'y 1, 2 Electrical Lab'y, 3 Drawing, 4	Applied Chemistry.	* Physical Lab'y, 3, 5 (a) Orders of Architecture, 1, 2 Drawing, 4	Applied Chemistry.	* Physical Lab'y, 3, 5 (a) Chemical Lab'y, 4 (b) Field Work, 1, 2, 4 (a) Drawing.	1-2 2-3
3-4	Mineralogical Lab'y 1, 2 Electrical Lab'y, 3 Drawing, 4	* Physical Lab'y, 1, 2, 4 (b) Mineralogical Lab'y, 5 Field Work, 1, 2, 4 (a) Drawing, 3	* Physical Lab'y, 3, 5 (a) Drawing, 4 do	* Physical Lab'y, 1, 2, 4 (b) Mineralogical Lab'y, 5 Field Work, 1, 2, 4 (a) Drawing, 3	* Physical Lab'y, 3, 5 (a) Chemical Lab'y, 4 (b) Field Work, 1, 2, 4 (a) Drawing.	3-4
4-5	Mineralogical Lab'y 1, 2 Electrical Lab'y, 3 Drawing, 4	* Physical Lab'y, 1, 2, 4 (b) Mineralogical Lab'y, 5 Field Work, 1, 2, 4 (a) Drawing, 3	* Physical Lab'y, 3, 5 (a) Drawing, 4 do	* Physical Lab'y, 1, 2, 4 (b) Mineralogical Lab'y, 5 Field Work, 1, 2, 4 (a) Drawing, 3	* Physical Lab'y, 3, 5 (a) Chemical Lab'y, 4 (b) Field Work, 1, 2, 4 (a) Drawing.	4-5

1, Civil Engineering; 2, Mining Engineering; 3, Mechanical and Electrical 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. 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 1894-95.

Hours	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	Hours
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TIME TABLE—THIRD YEAR—SESSION 1894-95.

Hours	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	Hours
9-10	* Biology, 5 Thermodynamics, 1, 2, 3 Drawing, 4	Hydraulics, 1, 2, 3, 4	* Biology, 5 Thermodynamics, 1, 2, 3 Pumping, Heating, 4	Hydraulics, 1, 2, 3, 4	* Biology, 5 Compound Stress, 1, 2, 3, 4	9-10
10-11	Drawing, 1, 2, 3, 4	Astronomy and Geodesy, 1, 2 Machine Design, History of Arch <sup>e</sup> , 4	Mineralogical Lab'y, 1, 2, 5 (a) Assaying, 3, 4 do 1 (b)	Astronomy and Geodesy, 1, 2 Machine Design, History of Architecture, 4	Drawing, 1, 2, 3, 4	10-11
11-12	Drawing, 1, 2, 3, 4	Constructive Design, 1, 2, 3, 4	Mineralogical Lab'y, 1, 2, 5 (a) Assaying, 3, 4 do 1 (b)	Descriptive Geometry, 1, 2, 3, 4 (a) Theoretical Squares, 1, 2, 3 (b) Pen and Ink, 4 (b)	Drawing, 1, 2, 3, 4	11-12
12-1	Applied Chemistry.	Mineralogy and Geology, 1, 2, 4, 5 Mechanics of Machinery, 3	Mineral Lab'y, 1, 2, 5 (a) Assaying, 3, 4 Principles of Doc <sup>t</sup> , 4 do 1 (b)	Mineralogy and Geology, 1, 2, 4, 5 Electricity, 3	Applied Chemistry.	12-1
1-2		Field Work, Electrical Lab'y, 3 Assaying, 2 (b) Drawing, 1, 4 (b)	Constructive Design, 1, 2, 3, 4	* Practical Biology, 5 Field Work, 1, 2, 4 (a) Electrical Lab'y, 3 Assaying, 2 (b) Drawing, 1, 4 (b)		1-2
2-3	* Physical Lab'y, 3, 5 (a) Drawing, 1, 2, 4 do 3 (b)	* Organic Chemistry, 5 Field Work, 1, 2, 4 (a) Electrical Lab'y, 3 Assaying, 2 (b) Drawing, 1, 4 (b)	Drawing, 1, 2, 3, 4	* Practical Biology, 5 Field Work, 1, 2, 4 (a) Electrical Lab'y, 3 Assaying, 2 (b) Drawing, 1, 4 (b)	* Physical Lab'y, 3, 5 (a) do 1, 2, 4 (b) Field Work, 1, 2, 4 (a) Drawing & Ore-dress <sup>g</sup> , 2 (b)	2-3
3-4	* Physical Lab'y, 3, 5 (a) * Organic Chemistry, 5 Drawing, 1, 2, 4 do 3 (b)	* Organic Chemistry, 5 Field Work, 1, 2, 4 (a) Electrical Lab'y, 3 Assaying, 2 (b) Drawing, 1, 4 (b)	Drawing, 1, 2, 3, 4	* Practical Biology, 5 Field Work, 1, 2, 4 (a) Electrical Lab'y, 3 Assaying, 2 (b) Drawing, 1, 4 (b)	* Physical Lab'y, 3, 5 (a) do 1, 2, 4 (b) * Organic Chemistry, 5 Field Work, 1, 2, 4 (a) Drawing, 2 (b)	3-4
4-5	* Physical Lab'y, 3, 5 (a) * Organic Chemistry, 5 Drawing, 1, 2, 4 do 3 (b)	Field Work, 1, 2, 4 (a) Electrical Lab'y, 3 Assaying, 2 (b) Drawing, 1, 4 (b)	Drawing, 1, 2, 3, 4	Field Work, 1, 2, 4 (a) Electrical Lab'y, 3 Assaying, 2 (b) Drawing, 1, 4 (b)	* Physical Lab'y, 3, 5 (a) do 1, 2, 4 (b) Field Work, 1, 2, 4 (a) Drawing, 2 (b)	4-5

1, Civil Engineering; 2, Mining Engineering; 3, Mechanical and Electrical Engineering; 4, Architecture; 5, Analytical and Applied Chemistry.  
\* Unless otherwise specified, the subjects not numbered are common 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 are from 9 a.m. to 5 p.m. every working day during the session. Lectures are given at such intervals as may suit the laboratory work.

## FACULTY OF THE SCHOOL.

J. GALBRAITH, M.A., M. CAN. SOC. C.E., PRINCIPAL<sup>7</sup>

### MEMBERS OF THE COUNCIL.

J. GALBRAITH, M.A., M. CAN. SOC. 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, P.L.S., D.T.S. .... *Lecturer in Surveying (Secretary).*  
 C. H. C. WRIGHT, B.A.Sc. .... *Lecturer in Architecture.*  
 T. R. ROSEBRUGH, M.A., GRAD. S.P.S. .... *Lecturer in Electrical Engineering.*  
 \* ..... *Lecturer in Applied Mechanics.*

### ASSISTANT INSTRUCTORS.

J. A. DUFF, B.A., GRAD. S.P.S. .... *Fellow in Civil Engineering.*  
 E. J. LASCHINGER, B.A.Sc. .... *Fellow in Mechanical Engineering.*  
 A. LANE, GRAD. S.P.S. .... *Fellow in Surveying.*  
 \* ..... *Fellow in Electrical Engineering.*  
 W. E. BOUSTEAD, GRAD. S.P.S., B.A.Sc. .... *Fellow in Metallurgy and Assaying.*  
 W. LAWSON, B.A.Sc. .... *Fellow in Analytical and Applied Chemistry.*

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

JAMES LOUDON, M.A. .... *President and Professor of Physics.*  
 E. J. CHAPMAN, Ph.D., LL.D. .... *Professor of Mineralogy and Geology.*  
 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.*  
 A. B. MACALLUM, B.A., M.B., Ph.D. .... *Professor of Physiology.*  
 C. A. LOUDON, B.A. .... *Demonstrator in Physics.*  
 C. A. CEANT, B.A. .... *Lecturer in Physics.*  
 J. C. MCLENNAN, B.A. .... *Assistant Demonstrator in Physics.*  
 ALFRED T. DELURY, B.A. .... *Lecturer in Mathematics.*  
 W. L. MILLER, B.A., Ph.D. .... *Demonstrator in Chemistry.*  
 J. W. ODELL, B.A. .... *Fellow in Mathematics.*  
 G. F. HULL, B.A. .... *Fellow in Physics.*

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

\* To be appointed before October 1st, 1894.

# SCHOOL OF PRACTICAL SCIENCE.

PROVINCE OF ONTARIO.

## CALENDAR FOR THE SESSION 1894-5.

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 the 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.

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

1. Civil Engineering (including Sanitary Engineering).
2. Mining Engineering.
3. Mechanical and Electrical 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 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.

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REGULATIONS  
RESPECTING THE  
SCHOOL OF PRACTICAL SCIENCE.

*Approved by His Honour, the Lieutenant-Governor in Council,  
the 3rd day of April, 1894.*

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) Mining Engineering.
  - (3) Mechanical and Electrical 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 in all the subjects of such Matriculation Examina-

tion except Greek and Latin, 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 or business, and passing an examination in the following subjects:—

*Arithmetic.*—Fundamental rules, metric system, fractions, decimals, powers, square root, mensuration, percentage, interest.

*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.

### ADMISSION.

The conditions of admission for regular and special students are stated in clauses 5, 6, 7 and 8 of the order-in-council, pp. 19 and 20.

For information regarding the conditions for Matriculation in the Universities, application must be made to the Registrars of these Institutions.

Information respecting the High School Leaving Examination may be obtained from the Education Department, Toronto, or from any Principal of a High School or Collegiate Institute.

Students intending to write at the High School Leaving Examination for the purpose of entering the School of Practical Science, may do so without having previously passed the Primary Examination. Their papers must be endorsed "For admission to School of Practical Science."

The only examination held in the School of Practical Science for the purpose of testing qualifications for admission, is that mentioned in clause 5 (b) order-in council, p. 20.

This examination will begin at 9 a.m., Wednesday, September 26th, 1894.

Candidates are required to give the Secretary at least two weeks' notice in writing of their intention to take this examination.

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 Pro-  
vince 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. 19 and 20.

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

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

### SESSIONAL FEES, DUES AND DEPOSITS.

These are payable in two instalments, one in each term.

A discount of two dollars will be made on each instalment if paid before the end of the first calendar month of the term in which it is due.

The following table shows the amounts payable in the Regular Courses:—

Year.	Description of Payment.	1. Civil Engineering.	2. Mining Engineering.	3. Mechanical and Electrical Engineering.	4. Architecture.	5. Analytical and Applied Chemistry.
		\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
I.	Payable in First Term—					
	Sessional Fees .....	22 00	22 00	22 00	22 00	22 00
	Dues—					
	Physical Laboratory .....			1 00		1 00
	Library .....	1 00	1 00	1 00	1 00	1 00
	Deposits—					
	General .....	2 00	2 00	2 00	2 00	2 00
	Chemical Laboratory .....	3 00	3 00	3 00	3 00	3 00
	Mineralogical Laboratory .....					
		28 00	28 00	29 00	28 00	29 00
	Payable in Second Term—					
	Sessional Fees .....	22 00	22 00	22 00	22 00	22 00
	Total .....	50 00	50 00	51 00	50 00	51 00

Year.	Description of Payment.	1. Civil Engineering.	2. Mining Engineering.	3. Mechanical and Electrical Engineering.	4. Architecture.	5. Analytical and Applied Chemistry.
		\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
II.	Payable in First Term—					
	Sessional Fees .....	27 00	27 00	27 00	27 00	27 00
	Dues—					
	Physical Laboratory .....	1 50	1 50	1 50	1 00	1 50
	Library .....	1 00	1 00	1 00	1 00	1 00
	Deposits—					
	General .....	2 00	2 00	2 00	2 00	2 00
	Chemical Laboratory .....	3 00	3 00	3 00	3 00	3 00
	Mineralogical Laboratory	2 00	2 00	.....	.....	2 00
		36 50	36 50	34 50	34 00	36 50
	Payable in Second Term—					
	Sessional Fees .....	27 00	27 00	27 00	27 00	27 00
	Total .....	63 50	63 50	61 50	61 00	63 50
III.	Payable in First Term—					
	Sessional Fees .....	32 00	32 00	32 00	32 00	32 00
	Dues—					
	Physical Laboratory .....	1 00	1 00	3 00	2 00	3 00
	Library .....	1 00	1 00	1 00	1 00	1 00
	Deposits—					
	General .....	2 00	2 00	2 00	2 00	2 00
	Chemical Laboratory .....	.....	.....	.....	.....	3 00
	Mineralogical Laboratory	2 00	2 00	.....	.....	.....
		38 00	38 00	38 00	37 00	41 00
	Payable in Second Term—					
	Sessional Fees .....	32 00	32 00	32 00	32 00	32 00
	Total .....	70 00	70 00	70 00	69 00	73 00

The total expense of a regular three years' course in any department is about \$280, which amount includes books, instruments and materials as well as the fees, etc., given in above table.

*Fourth or Post-Graduate Year.*—The fees, etc., in this year are as follows:—

Payable in First Term—	
Sessional Fees.....	\$30 00
Dues, Library.....	1 00
Deposits, General.....	2 00
Payable in Second Term—	
Sessional Fees.....	29 00
<b>Total.....</b>	<b>\$62 00</b>

*Special Students.*—The fees payable by special students are stated on p. 55 and following pages. All special students are required to pay the library fee, \$1, the general deposit, \$2, and the deposits and dues of the laboratories in which they work.

Information as to the text-books, instruments and materials to be purchased by the students will be given on registration at the beginning of the session.

#### FELLOWSHIPS.

The following fellowships have been established, open to graduates of the school:—Civil Engineering, Mechanical Engineering, Electrical Engineering, Surveying, Metallurgy and Assaying, Analytical and Applied Chemistry.

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.**

Candidates are required to send to the Secretary at least three weeks before the commencement of the Annual Examinations in April, and the Supplemental Examinations in October, notice in writing of their intention to take such examinations.

This regulation applies to all regular students and to such special students as may wish to be examined.

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	8	12	12	8	5	6
Descript. Geometry.	*7	12	11	7	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 number of drawings will include only such as shall be specially prescribed for the purpose.

\* These drawings will also be required in the Department of Analytica and Applied Chemistry.

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 number of drawings must be made, together with as many others as may be prescribed.

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

The minimum number of drawings shall be 25 and the maximum number 35, except in the Department of Analytical and Applied Chemistry, in which the numbers shall be 18 and 25 respectively.

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

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, 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.

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exami-

Applied  
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ecture.

II. Year.	III. Year.
5	6
9	10
0	0
9	7

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## VACATION WORK.

Vacation work must be handed in on or before Monday, October 8th, 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 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 in subjects taught by the staff of the school will begin on the second day of the session. In other subjects they will be held at the time of the annual examinations.

In the case where a candidate fails to pass a supplemental examination 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 or in graduating 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 9 a.m. and 5 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.

#### PRIZES.

Through the liberality of Mr. D. B. Dick, Architect, Toronto, a prize of \$10 in books will be open annually for competition in the first year of the Architectural Department.

#### HONORS.

Honors will be granted in each department to students who pass in all the subjects and obtain at least 66 per cent. of the total number of marks allotted to the department at the annual examinations.

Papers read before the Engineering Society will be considered in granting Honors.

The Honor list will be arranged alphabetically.

## REGULAR EXAMINATIONS.

(Approximate List.)

## I. YEAR.

Examinations held at end of session.

Algebra.	Statics . . . . .	1, 2, 3, 4.
Euclid.	Dynamics. . . . .	1, 2, 3, 4.
Plane Trigonometry.	Elementary Mechanics. . . . .	5.
Analytical Geometry . . . . .	Descriptive Geometry.	
History of Architecture. . . . .	Surveying . . . . .	1, 2, 3, 4.
Magnetism and Electricity . . . . .	Chemistry, Elementary.	
Acoustics . . . . .	Electricity . . . . .	3, 5.

Examinations held during the session.

Drawings.

Field Notes . . . . .	1, 2, 4.
Construction Notes. . . . .	1, 2, 3, 4.
Architectural Sketches . . . . .	4.
Experimental Physics. . . . .	3, 5.
Practical Chemistry.	
French and German. . . . .	5.

## II. YEAR.

Examinations held at end of session.

Calculus. . . . .	1, 2, 3, 4.	Strength of Materials . . . . .	1, 2, 3, 4.
Astronomy. . . . .	1, 2.	Rigid Dynamics . . . . .	1, 2, 3.
Optics		Theory of Mechanism . . . . .	3.
Hydrostatics		Descriptive Geometry. . . . .	1, 2, 3, 4.
Heat . . . . .	5.	Surveying. . . . .	1, 2, 4.
History of Architecture. . . . .	4.	Spherical Trigonometry. . . . .	1, 2, 3.
Orders of Architecture. . . . .	4.	Mineralogy and Geology. . . . .	1, 2, 4, 5.
History of Ornament. . . . .	4.	Electricity. . . . .	3, 5.
Chemistry, Inorganic. . . . .	5.	Metallurgy.	
Chemistry, Applied.			

1 Civil Engineering.

3 Mechanical and Electrical Engineering.

2 Mining Engineering.

4 Architecture.

5 Analytical and Applied Chemistry.

Examinations held during the session.

- Drawing .....1, 2, 3, 4.
- Field Notes .....1, 2.
- Construction Notes.....1, 2, 3, 4.
- Architectural Sketches.....4.
- Experimental Physics.
- Electricity, Practical.....3.
- Thesis (at beginning of session).
- Chemistry, Practical.
- Mineralogy, Practical.....1, 2, 5.
- French and German.....5.

III. YEAR.

Examinations held at end of session.

- Magnetism and Electricity.... 3, 5.
- History of Architecture .....4.
- History of Ornament.....4.
- Principles of Decoration .....4.
- Method of Least Squares... 1, 2, 3.
- Chemistry, Inorganic and Organic, 5.
- Chemistry, Applied.
- Mineralogy and Geology...1, 2, 4, 5.
- Sanitary Plumbing, Heating and Ventilation.....4.
- Theory of Compound Stress,1,2,3,4.
- Theory of Construction...1, 2, 3, 4.
- Mechanics of Machinery.....3.
- Machine Design .....3.
- Hydraulics.....1, 2, 3, 4.
- Thermodynamics.....1, 2, 3.
- Descriptive Geometry...1, 2, 3, 4.
- Practical Astronomy & Geodesy,1,2.
- Surveying and Levelling...1, 2, 4.
- Metallurgy .....2, 3, 5.
- Mining and Ore Dressing.....2.

Examinations held during the session.

- Drawings .....1, 2, 3, 4.
- Field Notes .....1, 2.
- Construction Notes.....1, 2, 3, 4.
- Architectural Sketches.....4.
- Experimental Physics.
- Electricity, Practical .....3.
- Thesis (at beginning of session).
- Chemistry, Practical.....5.
- Mineralogy, Determinative...1, 2, 5.
- Assaying.....2, 5.

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

3, 4.  
3, 4.  
5.  
3, 4.  
3, 5.  
2, 3, 4.  
1, 2, 3.  
3.  
1, 2, 3, 4.  
1, 2, 4.  
1, 2, 3.  
1, 2, 4, 5.  
3, 5.

Engineering.

## 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.

## DRAWING.

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

## CHEMISTRY.

Elementary Chemistry, with Laboratory Practice.

## MECHANICS.

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

## SURVEYING.

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

## II. YEAR.

## MATHEMATICS.

Differential and Integral Calculus.  
Spherical Trigonometry.  
Plane Astronomy.

**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.)

**CHEMISTRY.**

Chemistry with special reference to industrial applications.

Practical chemistry.

**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.

**MINERALOGY AND GEOLOGY.**

Elements of these Sciences.

Blowpipe practice.

Determination of minerals.

**METALLURGY.**

Iron and Steel.

**PHYSICS.**

Hydrostatics.

Optics.

**EXPERIMENTAL PHYSICS.**

Light : Use of lenses and mirrors.

Calculation of focal lengths.

The prism and spectroscope.

Goniometer and heliostat.

**VACATION WORK.**

See pages 28, 62 and 63.

## III. YEAR.

## DRAWING.

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

## CHEMISTRY (APPLIED).

Thermo-Chemistry.  
 Combustion.  
 Fuel.  
 Explosives.  
 Artificial Lighting.  
 Photography.

## 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, 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 a sphere).  
 Practical Astronomy (treated in the manner required for the  
     O.L.S. and D.L.S. Examinations).

## MINERALOGY AND GEOLOGY.

Economic Geology.  
 Blowpipe Analysis and Determinative Mineralogy.

**EXPERIMENTAL PHYSICS.**

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

**VACATION WORK.**

See pages 28, 62 and 63.

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**II. 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.

**DRAWING.**

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

**CHEMISTRY.**

Elementary Chemistry, with Laboratory Practice.

**MECHANICS.**

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

**SURVEYING.**

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

## II. YEAR.

## MATHEMATICS.

Differential and Integral Calculus.  
Spherical Trigonometry.  
Plane Astronomy.

## 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.)

## CHEMISTRY.

Chemistry, with special reference to industrial applications.  
Practical Chemistry.

## 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.

## MINERALOGY AND GEOLOGY.

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

## METALLURGY.

Iron and Steel.  
Ore-dressing.

## PHYSICS.

Hydrostatics.  
Optics.

**EXPERIMENTAL PHYSICS.**

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

**VACATION WORK.**

See pages 28, 62 and 63.

**III. YEAR.****DRAWING.**

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

**CHEMISTRY (APPLIED).**

Thermo-Chemistry.  
 Combustion.  
 Fuel.  
 Explosives.  
 Artificial Lighting.  
 Photograghy.

**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.  
     Foundation, etc.  
 Thermodynamics and Theory of 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  
 O.L.S. and D.L.S. Examinations.)

#### MINERALOGY AND GEOLOGY.

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

#### EXPERIMENTAL PHYSICS.

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

#### VACATION WORK.

See pages 28, 62 and 63.

### III. 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.

##### DRAWING.

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

##### CHEMISTRY.

Elementary Chemistry with Laboratory Practice.

**MECHANICS.**

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

**SURVEYING.**

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

**PHYSICS.**

Magnetism and Electricity.

**EXPERIMENTAL PHYSICS.**

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

**II. YEAR.****MATHEMATICS.**

Differential and Integral Calculus.  
Spherical Trigonometry.

**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.)

**CHEMISTRY.**

Chemistry, with special reference to industrial applications.  
Practical Chemistry.

**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.

**METALLURGY.**

Iron and Steel.

**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.

**VACATION WORK.**

See pages 28, 62 and 63.

**III. YEAR.****DRAWING.**

Subjects of previous years continued.

Descriptive Geometry:

Shades and Shadows.

Stone cutting.

Perspective Projection.

**CHEMISTRY (APPLIED).**

Thermo-Chemistry.

Combustion.

Fuel.

Explosives.

Artificial Lighting.

Photography.

**ENGINEERING.**

Subjects of previous years continued.

Applied Mechanics:

Mechanics of Machinery.

Machine Design.

Thermodynamics and Theory of the Steam Engine.

Hydraulics.

## Electricity :

Dynamos 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.

## METALLURGY.

Gold, Silver, Nickel, Copper, Lead.

## EXPERIMENTAL PHYSICS.

Electric Light Photometry.

Ballistic Galvanometer.

Heating Effects of Currents.

Electrometer.

Method of Least Squares.

## ORIGINAL DESIGNS.

Engine and Machine Design.

## VACATION WORK.

See pages 28, 62 and 63.

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.

## 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.

**DRAWING.**

Copying from the flat Lettering. Topography.  
Graphics.  
Descriptive Geometry in its application to plane sided solids,  
Orthographic (including Isometric) and Oblique Projection.  
Rendering in pencil and pen and ink.

**CHEMISTRY.**

Elementary Chemistry with Laboratory Practice.

**MECHANICS**

Statics (with reference to structures).  
Dynamics (preliminary to the study of hydraulics).

**SURVEYING.**

Principles, Chain Surveying, Mensuration.

**PHYSICS.**

Acoustics.

**HISTORY OF ARCHITECTURE.**

General introduction to subject.  
Ancient Architecture,  
Egyptian, Assyrian and Persian.

**II. YEAR.****MATHEMATICS.**

Differential and Integral Calculus.

**DRAWING.**

Instrumental Drawing, Drawing from the Cast, Sketching and  
Water Color, Pen and Ink.  
Descriptive Geometry (curved surfaces).

**CHEMISTRY.**

Chemistry, with special reference to industrial applications.  
Practical Chemistry.

**MECHANICS.**

Statics (pure and applied).  
 Strength and Elasticity of Materials.  
 Materials of Construction.  
 Experimental work in Engineering Laboratory.

**SURVEYING.**

Use of transit and level.  
 Mensuration.

**MINERALOGY AND GEOLOGY.**

Elements.

**METALLURGY.**

Iron and Steel.

**PHYSICS.**

Hydrostatics.  
 Optics.

**EXPERIMENTAL PHYSICS.**

Light : Uses 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.

**HISTORY OF ARCHITECTURE.**

Greek and Roman.  
 Romanesque and Byzantine.

**ORDERS AND ELEMENTS OF ARCHITECTURE.****HISTORY OF ORNAMENT.**

Ancient.  
 Classic—Greek. Roman.

**VACATION WORK.**

See pages 28, 62 and 63.

## III. YEAR.

## DRAWING.

Descriptive Geometry.

Shades and Shadows.

Stone cutting.

Perspective Projection.

Water Colorsketching.

Original Designs—Floors, Trusses, Arches, etc.

## CHEMISTRY (APPLIED).

Thermo-Chemistry.

Combustion.

Fuel.

Explosives.

Artificial Lighting.

Photography.

## THEORY OF CONSTRUCTION.

Experimental work in Engineering Laboratory.

## HYDRAULICS.

## SANITARY SCIENCE.

House Drainage and Plumbing, Ventilation and Heating.

## SURVEYING.

Levelling, Setting out Excavation, Mensuration.

## MINERALOGY AND GEOLOGY.

Economic Geology.

## EXPERIMENTAL PHYSICS.

Heat: 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 ORN

Early Cl

## PRINCIPLES OF I

## VACATION WORK

See page

## V. DEPART

This Departme  
ing to students w  
analytical chemis  
tion in chemistry  
and architecture,

## MATHEMATICS.

Euclid, A

## DRAWING.

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Model Dr

## CHEMISTRY.

Elementa

## MECHANICS.

Elementa

## PHYSICS.

Magnetis

## EXPERIMENTAL PH

Light: U

Calculatio

The prism

Goniomet

**HISTORY OF ORNAMENT.**

Early Christian ; Gothic and Renaissance.

**PRINCIPLES OF DECORATION.****VACATION WORK.**

See pages 28, 62 and 63.

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**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.

**DRAWING.**

Copying from the flat. Lettering.  
Descriptive Geometry in its application to plane sided solids.  
Orthographic (including Isometric) and Oblique Projection.  
Model Drawing.

**CHEMISTRY.**

Elementary Chemistry with Laboratory practice.

**MECHANICS.**

Elementary 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.

## MODERN LANGUAGES.

French.  
German.

## II. YEAR.

## CHEMISTRY.

Inorganic and Physical Chemistry.  
Applied Chemistry.  
Laboratory work in Quantitative and Qualitative Analysis.

## MINERALOGY AND GEOLOGY.

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

## METALLURGY.

Iron and Steel.

## PHYSICS.

Hydrostatics.  
Optics.  
Heat.

## 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.

## VACATION WORK.

See pages 28, 62, 63 and 64.

## III. YEAR.

## CHEMISTRY.

Organic Chemistry and Chemical Physics.  
Applied Chemistry.  
Laboratory work.

## MINERALOGY AND

Economic  
Blowpipe

## METALLURGY.

Gold, Silver

## PHYSICS.

Electricity

## BIOLOGY.

## VACATION WORK.

See pages 28, 62, 63 and 64.

In order to be admitted to the School of Chemistry it is necessary to have completed the course known as the

To be admitted to the School of Chemistry in the fourth year it is necessary to have completed the course of Chemistry and

The subjects of Chemistry and

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B. {  
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## MINERALOGY AND GEOLOGY.

Economic Geology.

Blowpipe Analysis and Determinative Mineralogy.

## METALLURGY.

Gold, Silver, Nickel, Copper, Lead.

## PHYSICS.

Electrical Measurements.

Electric Light Photometry.

Ballistic Galvanometer.

Heating Effects of Currents.

Electrometer.

## BIOLOGY.

## VACATION WORK.

See pages 28, 62, 63 and 64.

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 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, a sessional course of instruction known as the fourth year has been established.

To be admitted to the fourth year a candidate must be a graduate of the School of Practical Science or an undergraduate of the standing of the fourth year in the University of Toronto in the Honor Department of Chemistry and Mineralogy.

The subjects of study in the fourth year are arranged in the following groups and sub-divisions:—

- A. { Astronomy.  
Geodesy and Metrology.
- B. { Architecture.  
Strength and Elasticity of Materials.  
Hydraulics.  
Thermodynamics and Theory of Heat Engines.  
Electricity and Magnetism.

- C. { Industrial Chemistry.  
Sanitary and Forensic Chemistry.  
Inorganic and Organic Chemistry.
- D. { Mineralogy and Geology.  
Metallurgy and Assaying.

Each student will be required to confine his studies during the session to one of the above groups. He will not be allowed to take less than two nor more than three of the sub-divisions in any group.

The sub-division "Inorganic and Organic Chemistry" will be obligatory on all students who select group C.

A student is liable to be called on to assist in any of the experimental and practical work in the group which he has selected, although it may not belong to his special subjects.

Candidates are required to notify the Secretary in writing of their intention to take the fourth year work at least one week before the opening of the session, and to inform him at the same time as to the subjects which they propose to take. These subjects will be submitted to the Council for their approval at the beginning of the session, and no student will be permitted to take any subjects not so approved.

Undergraduates of the University of Toronto of the standing of the fourth year in the Honor Department of Chemistry and Mineralogy may be admitted as students in the fourth year in the groups C and D.

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.

#### PASS AND HONORS.

Total marks assigned to fourth year, ..... 900.

Sub-divided as follows:—

Work (reckoned in hours) ..... 540 marks.  
Records (notes, drawings, etc.) ..... 360 "

#### FOR PASS.

The minimum percentages are:—

Work, 75 per cent. .... 405 marks.  
Records, 50 " ..... 180 "  
And two-thirds of the total  
marks assigned ..... 600 "

#### FOR HONORS.

In deciding a candidate will be required to pass unless the candidate has done the member or the year work has

Honors grade clause 2 of the of B.A.Sc.

Courses of re

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Candidates w the School of F Applied Science passed by the S as follows:—

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Be it enacted: That the Degree established to l lations:—

1. Candidates f of Prac School, Honor sity of

2. They shall Post-G present Univer the Fac

## FOR HONORS.

In deciding the allotment of Honors the whole academic record of the candidate will be taken into consideration, but no honors will be granted unless the candidate shall have received a special recommendation from the member or members of council under whose supervision his fourth year work has been done.

Honors granted will be mentioned in the certificate required under clause 2 of the statute of the University of Toronto respecting the degree of B.A.Sc.

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

The above amendments were approved by the Senate of the University of Toronto in so far as they affect the degree of B.A.Sc. on March 9, 1894.

## 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 a statute passed by the Senate in 1892, which, with the amendments since made, is as follows:—

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. Honors may be granted with such certificates by the Faculty of the School.

..... 900.

..... 540 marks.

..... 360 “

..... 405 marks.

..... 180 “

..... 600 “

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. To pass in the Thesis a candidate must obtain 50 per cent., and to take honors 75 per cent., of the marks assigned.

4. Candidates will be required to select two sub-divisions in any one of the following groups, and to pass such written and oral examinations on the subjects selected as may be prescribed by the University examiners.

- A. { Astronomy.  
Geodesy and Metrology.
- B. { Architecture.  
Strength and Elasticity of Materials.  
Hydraulics.  
Thermodynamics and Theory of Heat Engines.  
Electricity and Magnetism.
- C. { Industrial Chemistry.  
Sanitary and Forensic Chemistry.  
Inorganic and Organic Chemistry.
- D. { Mineralogy and Geology.  
Metallurgy and Assaying.

The sub-division "Inorganic and Organic Chemistry" will be obligatory on all candidates who select group C.

To pass in each subject 33 per cent., and to take honors 66 per cent. of the marks assigned will be required.

5. The degree with honors will be conferred on candidates who obtain three out of the four honors possible.

- Viz.—Certificate with honors .....(cl. 2.)  
Thesis with honors .....(cl. 3.)  
Honors in each subject of examination (cl. 4.)

6. Candidates are required to send to the Registrar of the University at least three weeks before the commencement of the annual examinations an application for examination according to a printed form to be obtained from the Registrar, and such application must be accompanied by a fee of five dollars.

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7. The examination for the degree shall be held in May.
8. The fee for the degree shall be ten dollars and shall be paid to the Registrar not later than the first day of May.
9. 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.
10. The thesis, drawings, and other papers accompanying them, shall be the property of the University.
11. 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.

For further information apply to the Registrar of the University of Toronto.

#### DOMINION AND ONTARIO LAND SURVEYORS.

Courses of instruction will be given in accordance with the requirements of the Statutes relating to the Dominion and Ontario 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. (Cap. 152, R. S. O.)*

“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 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 years' 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.

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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.

*Extracts from the Ontario Architects' Act.*

"21. Any student who has matriculated in arts in any university in Her Majesty's dominions, or in the Ontario School of Practical Science, shall not be required to pass the preliminary examinations.

"23. Any person who applies for admission to registration as an architect after the coming into force of this Act, shall be not less than twenty-one years of age, shall have served as a student not less than five years with a principal or principals entitled to register under this Act, or with any other principal or principals approved by the council, and have passed such qualifying examinations as may be required by this Act.

"24.—(3) Any person who has graduated from the Ontario School of Practical Science shall be required to serve only three years as a student, one of which three years may be served during the vacation of such school.

"(4) Upon and after the passing of this Act, students shall serve such term as is required to be served by the provisions of this Act, under indenture, to a registered architect, which indenture and any assignment thereof with affidavit of execution thereto attached shall be filed with the registrar upon payment of such fee as the council may, by regulation, direct."

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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.

(For further information apply to the Registrar of the University of Toronto.

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**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. 23.*

*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~~ Text-books for the first year marked (a); for second year (b); for third year (c) and for fourth or post graduate 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—Projections.

Angel—Plane and Solid Geometry.

Binn—Orthographic Projection.

Millar—Descriptive Geometry, (a),

(b).

Warren—Stone Cutting (c).

MacCord—Lessons in Mechanical Drawing.

Worthen—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 Student's, \$14.

## PRACTICAL ASTRONOMY AND GEODESY.

## ORDINARY COURSE.

The work included in this course is sufficient to fulfil the requirements of the final examination 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.

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*Text-Books.*—

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## ADVANCED COURSE (FOURTH YEAR).

The work in this course is intended to fulfil the requirements of the final examinations for Dominion topographical surveyors. It is distinguished from the work of 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*), (*d*).

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

Chauvenet's Spherical and Practical Astronomy.

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

Nautical Almanac, 1895 (*c*), (*d*).

Fee for Special Students, \$19.

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 APPLIED MECHANICS.

## STATICS.

The calculation of the stresses in framed structure, 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, roofs, bridges, etc.

## DYNAMICS.

Representation and measurements of forces and motions.

Principals 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. Sewerage, Water-works, 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.

Johnson—Modern Framed Structures.

Merriman—Mechanics of Materials (b), (c), (d).

Rankine—Applied Mechanics.

Lanza—Applied Mechanics (d).

Low and Bevis—Machine Drawing and Design (b), (c).

Unwin—Elements of Machine Design (c).

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

Peabody—Thermodynamics (d).

“ Steam Tables (d).

Carpenter—Experimental Engineering (d).

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

Merriman—Hydraulics (c), (d).

Bodmer—Hydraulic Motors, Turbines, etc. (d).

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.

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- Text-Books and Books of Reference.*—Rankine—Machinery and Millwork.  
 Halsey—Slide Valve Gears.  
 MacCord—Slide Valve and Eccentric.  
 Goodeve—Elements of Mechanism (b).  
 Kennedy—Mechanics of Machinery (b), (c).

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 and Wilkinson — Practical Notes for Electric Students (a), (b).  
 Stewart & Gee—Practical Physics (b).  
 Kempe—Electrical Testing (b).  
 Cumming—Theory of Electricity (c).

Thompson, S. P.—Dynamo Electric Machinery (c), (d).

Kapp—Electric Transmission of Energy (d).

Blakesley—Alternating Currents (d)

Bedell and Crehore—Alternate Currents (d).

Fleming—Alternate Current Transformers, Vol. I. and II. (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—History of Architecture.

Gwilt—Encyclopædia of Architecture.

Vignole—The Five Orders of Architecture (b), (c).

Leed—Orders of Architecture (b).

Owen Jones—Grammar of Ornament.

Racinet—L'Ornement Polychrome.

Fee for Special Students, \$19.

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## 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.

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## 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.  
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, Sewage, Chemical Manufactures.  
Laboratory Work, including Technical Analysis, the Analysis of Food, Water and Air, and Toxicology.

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

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## MINERALOGY AND GEOLOGY.

MINERALOGY, GEOLOGY, MINING AND METALLURGY.

1. Mineralogy and Geology—
  - Mineralogy and Crystallography.
  - Geology and Palæontology.
  - Lithology.
  - Physical Geography.
  - Blowpipe Analysis.
  - Determinative Mineralogy.

*Books of Reference.*—Chapman—Mineralogy and Geology of Canada.  
 Dana—Manual of Geology.  
 Dana—System of Mineralogy.  
 Nicholson—Palæontology.  
 Geikie—Text-Book of Geology.  
 Plattner—Manual of Blowpipe Analysis.  
 Chapman or Brush—Mineral Tables.

## 2. Mining and Metallurgy—

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

Ihlseng—Manual of Mining.  
 Kœhler—Bergbaukunde.  
 Kuhnhardt—Ore Dressing.  
 Phillip—Ore Deposits.  
 Ballig—Metallhuettenkunde.  
 Schnabel—Allgemeine Huettenkunde.  
 Phillip and Bauerman—Elements of Metallurgy.  
 Mitchell—Assaying by Crookes.  
 Kerr—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 architectural 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 standing at the next following examination.

*Subject of Thesis*

“ “

*Books of Reference*

*Subject of Thesis*

“ “

*Books of Reference*

*Subject of Thesis*

“ “

*Books of Reference*

For the second  
 be required :—

I. D  
 II. S  
 III. A  
 A

*Subject of the Thesis*

“ “

*Books of Reference*

## CIVIL ENGINEERING.

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

“ “ *Third* “ Sanitary Drainage.

*Books of Reference.*—Gillmore—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.

## MINING ENGINEERING.

*Subject of Thesis for Second Year.*—Ore-dressing.

“ “ *Third* “ Mining.

*Books of Reference.*—Kuhnhardt—Ore-dressing in Europe.  
Ihlseng.—Manual of Mining.

## 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.

## ANALYTICAL AND APPLIED CHEMISTRY.

*Subject of Thesis for Second Year.*—Sulphuric Acid and Alkali Manufacture.

“ “ *Third* “ Coal Tar Products.

*Books of Reference.*—Lunge—Manufacture of Sulphuric Acid and Alkali.

Wagner—Chemical Technology.

Thorpe—Dictionary of Applied Chemistry.

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 application of power. This department is sub-divided into the steam laboratory, the hydraulic laboratory and 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 and Wilcox 52-horsepower boiler.

A Harris

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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 100,000 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 Gulcher machines, a Westing-house 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. Also a variety of electrical measuring apparatus, including a Thomson electrical balance.

The power department is equipped with the usual measuring instruments, indicators, gauges, gauge testing apparatus, scales, brakes, dynamometers.

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. Lithological microscopes and a lathe with all necessary facilities for the preparation and study of thin rock sections have been provided.

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### 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 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, Crookes' tubes, telephones, etc., etc.

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### 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.

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### LIBRARY, MUSEUMS, ETC.

The Library is supplied with a number of the more important scientific and technical periodicals. A small but valuable collection of works of reference on the subjects of study pursued in the School has been formed and is being added to year by year.

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Several thousand specimens have been procured for the Museum, which now contains mineralogical, lithological, metallurgical, and palæontological collections, affording a wide range of material for instruction in the subjects of Mineralogy, Geology and Metallurgy. During the past year the large and valuable exhibit of minerals sent by the Ontario Government to the Columbian Exhibition at Chicago has been presented to the School.

A beginning has also been made in the collection of specimens illustrating Industrial Chemistry and Architecture.

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SOCIETIES.

THE ENGINEERING SOCIETY OF THE SCHOOL OF PRACTICAL SCIENCE.

OFFICERS FOR 1893-4.

<i>President</i> .....	J. D. Shields,
<i>Vice-President</i> .....	H. Rolph.
<i>Secretary</i> .....	J. Armstrong.
<i>Treasurer</i> .....	A. T. Tye.
<i>Corresponding Secretary</i> .....	W. A. Bucke.
<i>Librarian</i> .....	H. F. Barker.
<i>Representatives—Graduates</i> ....	E. B. Merrill, Grad S.P.S., B.A.
	Fourth Year...H. F. Ballantvne.
	Third Year...A. E. Bergey.
	Second Year...F. W. Guernsey.
	First Year....H. B. Poliwka.

The Society meets every second Wednesday 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.

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ALUMNI ASSOCIATION OF THE SCHOOL OF PRACTICAL  
SCIENCE.

OFFICERS FOR 1894.

<i>President</i> .....	G. H. Duggan, M. Can. Soc.C.E.
<i>First Vice-President</i> .....	Jas. McDougall, B.A.
<i>Second Vice-President</i> .....	R. W. Thomson, B.A.Sc.
<i>Councillors</i> .....	E. F. Ball, A.M. Can. Soc.C.E. J. McAree, B.A.Sc., O.L.S., D.T.S. J. Hutcheon, O.L.S. G. F. Hanning. C. H. Mitchell.
<i>Secretary-Treasurer</i> .....	Andrew Lane.

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

STU

Carpenter, H.  
Crews, H. R.  
Handy, E. F.

Armstrong, J.  
Boswell, E. J.  
Dobie, J. S.  
Guernsey, F.

Barker, H. F.  
Bergey, A. E.  
Burton, T.  
Chalmers, J.

DEPA

Allan, A. A.  
Blackwood, C.  
Bell, A.  
Campbell, G.  
Fowler, C. P.  
Gurney, W.  
Hartman, G.  
Haight, H. V.

PRACTICAL

an. Soc.C.E.

.Sc.

n. Soc.C.E.

O.L.S.. D.T.S.

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## SESSION 1893-94.

## STUDENTS IN ATTENDANCE.

## REGULAR STUDENTS.

## DEPARTMENT OF CIVIL ENGINEERING.

*1st Year.*

Carpenter, H. S.	Laing, W. F.	Stewart, J. A.
Crews, H. R.	Martin, T.	Webster, E. B.
Handy, E. F.	Proudfoot, H. W.	

*2nd Year.*

Armstrong, J.	Gordon, J. P.	Robinson, F. J.
Boswell, E. J.	Johnson, G.	Sims, H. B.
Dobie, J. S.	Meadows, W. W.	Tye, A. T.
Guernsey, F. W.	Poussett, H. R.	

*3rd Year.*

Barker, H. F.	Fraser, A. T.	McTaggart, A. L.
Bergey, A. E.	Jones, J. E.	Rolph, H.
Burton, T.	Johnson, S. M.	Shields, J. D.
Chalmers, J.		

DEPARTMENT OF MECHANICAL AND ELECTRICAL  
ENGINEERING.*1st Year.*

Allan, A. A.	Harman, O. E.	MacMurchy, J. A.
Blackwood, C. K.	Jackson, T. C.	McKechnie, R. S.
Bell, A.	Karn, F. H.	Mollins, C. B.
Campbell, G. McK.	King, C. F.	Pease, H. C.
Fowler, C. P.	Laurie, R. R.	Wickson, F. R.
Gurney, W. C.	Macmillan, W. G.	Wade, H. R.
Hartman, G.	Macbeth, C.	Watson, J. W.
Haight, H. V.		

*2nd Year.*

Blackwood, A. E.	Hull, H. S.	Moore, I. E.
Brown, L. L.	Hudspeth, E.	Plummer, T. H.
Brodie, W. M.	McGowan, J.	Tremaine, R. C. C.
Brebner, G.	McKinnon, H. L.	Wood, H. T.
Connor, A. W.	McKay, W. N.	Black, R. G.
Elliott, H.	Patterson, G. E.	Hewett, C. H.
Gray, R. L.	Stocking, F. T.	

*3rd Year.*

Angus, R. W.	Herald, W. J.	Minty, W.
Boyd, D. G.	Job, H. E.	Nicholson, C. J.
Beauregard, A. T.	Johnston, A. C.	Spotton, A. K.
Bucke, W. A.	Lash, N. M.	Wright, R. T.
Hanly, J. B.		

## DEPARTMENT OF MINING ENGINEERING.

*1st Year.*

Bain, J. W.	DeCew, J. A.
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*2nd Year.*

McPherson, C. W.

## DEPARTMENT OF ARCHITECTURE

*1st Year.*

Forward, E. A.	McMaster, C. G.	Morphy, E. J.
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*2nd Year.*

Campbell, R. J.	Clark, J. T.	Harkness, A.
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*3rd Year.*

Ewart, J. A.

## DEPARTMENT OF ANALYTICAL AND APPLIED CHEMISTRY.

*2nd Year.*

Smith, V. S.

## FOURTH OR POST-GRADUATE YEAR.

Ballantyne, H. F.	Squire, R. H.	James, D. D.
Chewett, H. J., C.E.	Speller, F. N.	Keele, J.
Goodwin, J. B.	Mitchell, C. H.	Laidlaw, J. T.
McPherson, A. J.	McAllister, A. L.	Merrill, E. B., B.A.

Jameson, A. F.  
Parker, W. G.

## MECH

Booth, F. E.  
Graham, W. A.  
Hamilton, R.  
Kerr, R.  
Lea, E. P.  
McCullough,

Betty, H. K.

Baker, H. C.  
McKay, F. G.

Taylor, A. P.

Thomson, R.

## SPECIAL STUDENTS.

### CIVIL ENGINEERING.

Jameson, A. P. . . . . Tate, E. F. R.          Gibson, H. H.  
Parker, W. G. . . . . Troup, G. E.

### MECHANICAL AND ELECTRICAL ENGINEERING.

Booth, F. E.                  Poliwka, H. B.          Stacey, G. E.  
Graham, W. A.              Rings, H. C.          Shipe, R. R.  
Hamilton, R.                Roy, A.                Shipe, E. F.  
Kerr, R.                      Roberts, W. M.        Wellington, E. S.  
Lea, E. P.                    Sifton, E. I.          Wright, T. D.  
McCullough, A. W.

### MINING ENGINEERING.

Betty, H. K.          Evans, R. B.          Moore, H. H.          Burwash, L. T.

### ARCHITECTURE.

Baker, H. C.                          Simpson, A. E.  
McKay, F. G.                         Scott, W. F.

### CHEMISTRY.

Taylor, A. P.          McBride, C. A.          J. A. Ardagh, Grad. S.P.S.

### ELECTRICITY.

Thomson, R. W., B.A.Sc.          Moore, F. A.

## 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. k. Raymer.....	2nd prize.
1885.— I. Year.....	A. F. 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.— I. Ye	“ “
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III. Ye	“ “
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1891.— I. Ye	“ “
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1892.— I. Y	“ “
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III. Y	“ “
1891.— I. Y	“ “
1892.— I. Y	“ “
1893.— I. Y	“ “

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.
1892.—	I.	Year	A. E. Bergey	1st prize.
	"	"	R. W. Angus	2nd prize.
	II.	Year	A. J. McPherson	1st prize.
	"	"	R. B. Watson	2nd prize.
	III.	Year	E. J. Laschinger	1st prize.
	"	"	C. Fairchild	2nd prize.

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ARCHITECTURE.

1891.—	I.	Year	H. Ballantyne.
1892.—	I.	Year	J. A. Ewart.
1893.—	I.	Year	A. Harkness.

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## GRADUATES.

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

## CIVIL ENGINEERING.

- 1881.—Morris, J. L., C.E., O.L.S.,  
Pembroke, Ont.
- 1882.—Jeffrey, D., Contractor,  
Stratford, Ont.  
Kennedy, J. H., C.E., O.L.S., Architect, etc.,  
Resident Engineer, Sault Line, Shedden, Ont.  
McAree, J., B.A.Sc., O.L.S., D.T.S.,  
536 Ontario St., Toronto.
- 1883.—Burns, D. & O.L.S., A. M. Can. Soc. C.E.,  
Engineer's Staff, Pennsylvania Co., Pittsburgh, Pa.  
Duggan, G. H., M. Can. Soc. E.E.,  
Chief Engineer, Dominion Bridge Co., Montreal.  
Tyrrell, J. W., C.E., D. & O.L.S.,  
Hamilton, Ont.
- 1884.—Kirkland, W. C.,  
Illinois Central Ry., New Orleans, La.  
McDougall, J., B.A.,  
County Engineer, Court House, Toronto.  
Raymer, A. R.,  
Engineer's Office, Lake Shore and Michigan Southern R.R.,  
Toledo, Ohio.  
Robertson, J., O.L.S.,  
Coad & Robertson, Civil Engineers, P. L. Surveyors, etc.,  
Glencoe, Ont.  
Stern, E. W.,  
Engineer Scharpe & Kohen Architectural Iron Co., St. Louis,  
Mo.
- 1885.—Bleakley, F. W.,  
Seattle, W. T.  
Bowman, H. J., D. & O.L.S.,  
Town Engineer, Berlin, Ont.  
Henderson, E. E., O.L.S.,  
Henderson P. O., Piscataquis, Me.
- 1885.—Ludgate, J.  
Denisc  
McKay, O  
Winds
- 1886.—Bowman,  
Staff U  
Hermon, J  
Gordon  
Laird, R.,  
Assista  
Thomson,  
Crane  
Tyrrell, H  
Berlin
- 1887.—Burns, J.  
Lott, A. E  
Railwa  
McCulloug  
Reside  
Martin, F.  
Hospit  
Pinhey, C.  
630 W  
Roger, J.,  
Mitche
- 1888.—Apsey, J.  
242 W  
Ashbridge  
City E  
Ball, E. F  
172 Bi  
Brown, D. J  
Mexico  
Caniff, C.  
City S  
Chewett, J  
School  
Gibbons,  
Alaska

- 1885.—Ludgate, B.A., O.L.S.,  
Denison, Texas.  
McKay, O., O.L.S.,  
Windsor, Ont.
- 1886.—Bowman, A. M., D. & O.L.S.,  
Staff U. S. Engineers, Ohio River Improvement, Vanport, Pa.  
Hermon, E. B., D. & O.L.S.,  
Gordon, Hermon & Burwell, Vancouver, B.C.  
Laird, R., O.L.S.,  
Assistant to Waterworks Engineer, City Hall, Toronto.  
Thomson, T. K., C.E.,  
Crane Dept., Yale & Towne, Stamford, Conn.  
Tyrrell, H. G., A. M. Can. Soc. C.E.,  
Berlin Iron Bridge Co., East Berlin, Conn.
- 1887.—Burns, J. C. (Deceased).  
Lott, A. E.,  
Railway Construction, San Antonio de la Huerta, Mexico  
McCullough, A. L., O.L.S., A.M. Can. Soc. C.E.,  
Resident Sewerage Engineer, West Toronto Junction.  
Martin, F., O.L.S., M.B.,  
Hospital for Sick Children, Toronto.  
Pinhey, C. H., D. & O.L.S.,  
630 Wellington St., Ottawa, Ont.  
Roger, J., O.L.S.,  
Mitchell, Ont.
- 1888.—Apsey, J. F., O.L.S.,  
242 W. Biddle St., Baltimore, Md., U.S.  
Ashbridge, W. T.,  
City Engineer's Office, Toronto.  
Ball, E. F., A.M. Can. Soc. C.E.,  
172 Bird Ave., Buffalo, N.Y.  
Brown, D.B., O.L.S.,  
Mexican Southern Railway, Old Mexico.  
Caniff, C.M.,  
City Surveyor's Office, Toronto.  
Chewett, H. J., C.E., A.M. Can. Soc. C.E.,  
School of Practical Science, Toronto (Post-graduate course).  
Gibbons, J., D. & O.L.S.,  
Alaska Boundary Survey.

1888.—McDowall, R., O.L.S., A.M. Can. Soc. C.E.,  
Owen Sound, Ont.

McFarlen, G. W., O.L.S.,  
Assistant County Engineer, Court House, Toronto.

Marani, C. J.,  
Canada Permanent Loan Co., Vancouver.

Mickle, G. R., B.A.  
Mining Engineer, Sudbury, Ont.

Moore, J. H., O.L.S.,  
Jmith's Falls, Ont.

Richardson, G. H.,  
Engineer Pacific Division, C.P.R.

Rose, K.,  
Mexican Southern Railway, Tonilla, Est-de-Jalisco, Mexico.

Ross, J. E., O.L.S.,  
Riverside, Cal.

Wright, C. H. C., B.A. Sc.,  
Lecturer in Architecture, S.P.S., Toronto.

1889.—Carey, B.,  
Engineer's Office, Toronto, 30 Russell St.

Chalmers, W. J.  
Cayuga, Ont.

Clement, W. A.,  
City Engineer's Office, Toronto.

Hanning, G. F.,  
City Engineer's Office, Toronto.

Haultain, H. E. T.,  
Bucke, Haultain & Richardson, Consulting Mining and  
Electrical Engineers, Kaslo, Kootenay, B.C.

Irvine, J.,  
Harriston, Ont.

James, D. D., O.L.S.,  
School of Practical Science, Toronto (Post-graduate course).

Mill, F. X.,  
City Engineer's Office, Brockville.

Moberly, H. K.,  
Frostburg, Va., U.S.A.

Rosebrugh, T. R., M.A.,  
Lecturer in Electrical Engineering, S.P.S., Toronto.

Wickett, T.,  
University Medical College, Toronto.

1890.—Bowman,  
Chief I  
Bucke, M.  
Bucke  
Ele

Corrigan,  
Box 28

Duff, J. A.  
Fellow

English, A  
106 G

Garland, I  
Egling

Hutcheon,  
Guelp

Innes, W.  
Ranne

On  
Merrill, E  
Toront

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Pedder, J  
J. Gal

Wiggins,  
Saund

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Withrow,  
Fethe

1891.—Beatty, H  
Engin

br

Deacon, I  
Rat P

Dill, C. W  
Staff c

Lane, A.,  
Fellov

McAllister  
Domir

Moore, J.  
Islingt

Newman,  
Maycc

- 1890.—Bowman, F. M., O.L.S., C.E.,  
Chief Draftsman, Riter & Conley, Alleghany, Pa.
- Bucke, M. A.,  
Bucke, Haultain & Richardson, Consulting, Mining and  
Electrical Engineers, Kaslo, Kootenay, B.C.
- Corrigan, C. D.,  
Box 292, Vancouver, B.C.
- Duff, J. A., B.A.,  
Fellow in Engineering, S.P.S., Toronto.
- English, A. B.,  
106 Gould St., Toronto.
- Garland, N. L.,  
Eglington, Ont.
- Hutcheon, J., O.L.S.,  
Guelph, Ont.
- Innes, W. L., O.L.S., C.E.,  
Ranney & Innes, Civil Engineers and Surveyors, Peterboro',  
Ont.
- Merrill, E. B., B.A.,  
Toronto Technical School, School of Practical Science (Post-  
graduate course).
- Pedder, J. R., O.L.S.,  
J. Galt, C.E., Toronto.
- Wiggins, T. H., O.L.S.,  
Saunders & Wiggins, Civil Engineers and Surveyors, Brock-  
ville, Ont.
- Withrow, W. J.,  
Fetherstonhaugh & Co., Toronto.
- 1891.—Beatty, H. J., O.L.S.,  
Engineer's Staff, Atlantic & N. W. Division C.P.R., Pem-  
broke, Ont.
- Deacon, T. R., O.L.S.,  
Rat Portage, Ont.
- Dill, C. W.,  
Staff of Willis Chipman, C.E., 21 Wood St., Toronto.
- Lane, A.,  
Fellow in Surveying, S.P.S., Toronto.
- McAllister, J. E.,  
Dominion Bridge Co., Montreal, P.Q.
- Moore, J. E. A.,  
Islington, Ont.
- Newman, W., O.L.S.,  
Maycock & Newman, Windsor, Ont.

1891.—Robinson, J. K., Deceased.

Russel, W.,

Engineer's Staff O. A. & P. S. Ry, Pembroke, Ont.

Silvester, G. E., O.L.S.,

Ringwood, Ont.

Synnes, H. D.,

Engineer Street Ry., St. Catharines, Ont.

1892.—Allan, J. R.,

Renfrew, Ont.

Alison, T. H., B.A. Sc.,

52 Murray St., Toronto.

Anderson, A. G.,

Boston Bridge Co., 61 Hancock St., Boston, Mass.

Fairchild, C.,

City Engineer's Office, Brantford, Ont.

Goodwin, J. B.,

School of Practical Science, Toronto (Post-graduate course).

Laschinger, E. J., B.A. Sc.,

Fellow in Mechanical Engineering, School of Practical Science,  
Toronto.

Laing, A. T., B.A. Sc.,

Engineer's Staff, L. S. & M. S. Ry., Toledo, O.

McEntee, B., B.A. Sc.,

23 Queen St. E., Toronto.

Mitchell, C. H.,

School of Practical Science (Post-graduate course).

Playfair, N. L.,

Hall Signal Co., Baltimore, Md.

Prentice, J. M., Deceased.

Ross, J. A.,

Engineer's Staff, L. S. & M. S. Ry., Toledo, O

Smith, A.,

Napanee, Ont.

Thomson, R. W., B.A. Sc.,

Toronto Technical School.

1893.—Ardagh, J. A.,

School of Practical Science, Toronto. (Special Student.)

Brown, G. L.,

Morrisburg, Ont.

Charlesworth, L. C.,

Bedford Park, Ont.

Dunn,

Ark

Fairbai

Eng

Foreste

Gor

Francis

Gra

Laidlaw

Sch

McFarl

10 f

McPhe

Sch

McAlli

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Macall

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Main,

Bra

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Sta

Mines,

Mo

Russel,

En

Speller

Sch

Squire.

Sch

Taylor,

Re

Watson

Dr

1890.—Ross,

Ro

1891.—Merril

To

- Dunn, T. H.,  
Arkona, Ont.
- Fairbairn, J. M. R.,  
Engineer Branch, Militia Department, Ottawa, Ont.
- Forester, C.,  
Gormley, Ont.
- Francis, W. J.,  
Grand Trunk Railway, Toronto.
- Laidlaw, J. T.,  
School of Practical Science, Toronto (Post-graduate course).
- McFarlen, T. J.,  
10 St. Vincent St., Toronto, Ont.
- McPherson, A. J.,  
School of Practical Science, Toronto (Post-graduate course).
- McAllister, A. L.,  
School of Practical Science, Toronto (Post-graduate course).
- Macallum, A. F.,  
257 Wellesley St., Toronto, Ont.
- Main, W. T.,  
Brampton, Ont.
- Marani, V. G.,  
Staff of City Engineer, Cleveland, O.
- Mines, W.,  
Mount Brydges, Ont.
- Russel, R.,  
Engineer's Staff, O. A. & P. S. Ry., Pembroke, Ont.
- Speller, F. N.,  
School of Practical Science, Toronto (Post-graduate course).
- Squire, R. H.,  
School of Practical Science, Toronto (Post-graduate course).
- Taylor, W. V.,  
Rathbun Co., Gananoque, Ont.
- Watson, R. B.,  
Draftsman, Pittsburg Bridge Co., Pittsburg, Pa.

MECHANICAL AND ELECTRICAL ENGINEERING.

- 1890.—Ross, R. A.,  
Royal Electrical Co., Montreal, P.Q.
- 1891.—Merrill, E. B., B.A.,  
Toronto Technical School, School of Practical Science (Post-graduate course).

- 1892.—Lea, W. A., B.A. Sc.  
5 Bedford Road, Toronto.
- Milne, C. G., B.A. Sc.,  
Brown's Corners, Ont.
- White, A. V.,  
Edison General Electric Co., Peterboro, Ont.
- 1893.—Goldie, A. R.,  
Goldie & McCullough, Galt, Ont.
- Hanly, S. C.,  
Waubashene, Ont.
- Lash, F. L.,  
18 Grenville St., Toronto.
- Robertson, J. M.,  
Sibley College, Cornell University, Ithica.

Date of Admiss

1885 . . .  
1886 . . .  
1889 . . .  
1892 . . .  
1892 . . .  
1893 . . .  
1893 . . .

## ARCHITECTURE.

- 1892.—Langley, C. E.,  
Langley & Langley, Architects, Toronto.
- 1893.—Ballantyne, H. F.,  
School of Practical Science, Toronto (Post-graduate course).
- Fingland, W.,  
Ellis & Fingland, Architects Equitable Bdg., Baltimore.
- Keele, J.,  
School of Practical Science, Toronto (Post-graduate course).

Date of Admiss

1893 . . .  
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1893 . . .  
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## ANALYTICAL AND APPLIED CHEMISTRY.

- 1890.—Boustead, W. E., B.A. Sc.,  
Fellow in Metallurgy and Assaying, S.P.S., Toronto.
- 1891.—James, O. S., B.A. Sc.  
102 Howard St., Toronto, Ont.
- 1892.—Lawson, W., B.A. Sc.,  
Fellow in Chemistry, School of Practical Science, Toronto.

## 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.
1893.....	W. L. Innes.
1893.....	F. M. Bowman.

## DEGREE OF B. A. Sc.

## Date of Admission.

1893.....	Alison, T. H.
1893.....	James, O. S.
1893.....	Laing, A. T.
1893.....	Laschinger, E. J.
1893.....	Lawson, W.
1893.....	Lea, W. A.
1893.....	McAree, J.
1893.....	McEntee, B.
1893.....	Milne, C. G.
1893.....	Thomson, R. W.
1893.....	Wright, C. H. C.