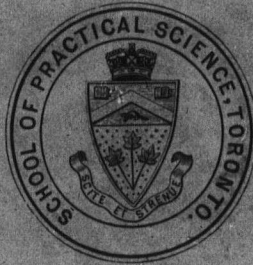


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Univ. of Toronto, University of Faculty
of Applied Science and Engineering

Calendar
PROSPECTUS

OF THE
SCHOOL OF PRACTICAL SCIENCE,
PROVINCE OF ONTARIO,
WITH A
SYLLABUS
OF THE
COURSES OF INSTRUCTION AND OF THE REGULATIONS
FOR
DIPLOMAS.



SECOND SESSION, 1879-80.

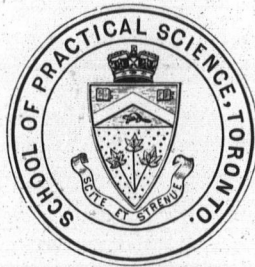
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Faculty of the School.

- H. H. CROFT, D. C. L. *Professor of Chemistry.*
E. J. CHAPMAN, Ph. D., LL.D. *Professor of Mineralogy and Geology.*
JAMES LOUDON, M.A. *Professor of Mathematics and Natural
Philosophy.*
R. RAMSAY WRIGHT, M.A., B. Sc. *Professor of Biology.*
J. GALBRAITH, M.A., Assoc. M. INST. C. E. *Professor of Engineering.*
W. H. ELLIS, M.A., M.B. *Assistant to the Professor of Chemistry.*
-

Secretary of the Board:

Prof. R. RAMSAY WRIGHT,

To whom application may be made for information further than that contained in
the present Prospectus.

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School of Practical Science,

PROVINCE OF ONTARIO.

PROGRAMME FOR THE SESSION 1879-80.

In the Session of 1877 the Legislative Assembly, by Resolution, sanctioned the proposals for the permanent establishment of the School contained in the memorandum of the Minister of Education, dated the 30th day of January, 1877, and approved by the Lieutenant-Governor in Council, on the 3rd day of February, 1877.

These proposals were in effect that the Government, instead of appointing a distinctive professional staff for giving the special instruction which the School (the former College of Technology) was founded to afford, should utilize the teaching power of University College, which already existed for the like objects in four departments, and could be made applicable to the wants of this Science School; and in addition thereto should appoint a Professor of Engineering and such Assistants in the several departments as might be required in supplementing the work of the College Professors.

The building purchased for the former College of Technology was unsuitable in its structure, and could not afford the laboratory and other accommodation required for instruction of this special

nature, and, indeed, did not possess the requisite appliances or apparatus. It became necessary, therefore, that a new building should be erected upon a site in proximity to the Provincial University. By this plan, it was considered that an economical mode could be adopted of establishing an Institution which, while not comparing with the larger and more expensive ones of Europe and the United States of America in the technical training of its students, would be able, nevertheless, to supply a want in our Educational System, and afford a thoroughly practical education in physical science with a direct bearing on the professions or occupations which they might wish to follow. It would thus in fact become a *School of Practical Science*, and as such would secure benefits commensurate with the moderate expenditure for its establishment and maintenance.

The arrangements consequent upon this Resolution of the House of Assembly have been completed, and the new building is now occupied. It contains commodious Chemical, Assaying, Physical and Biological laboratories, Chemical and Engineering Lecture Rooms, Designing and Draughting Room, Apparatus and Model Rooms in addition to private laboratories, storerooms, balance rooms and experimental rooms, and is furnished with requisite fittings and apparatus in the several departments.

The position which it is intended the School of Practical Science shall satisfactorily occupy in our Educational System may be indicated as follows:—

Firstly.—Students, who have passed through the regular courses of the School will be enabled to prosecute professionally, (1) Engineering; (2) Assaying and Mining Geology, or (3) Analytical and Applied Chemistry. With this view the Diploma admitting to the standing of "Associate of the School," will be granted in each of these branches after due examination.

In Engineering, it is intended that the instruction shall afford a thoroughly scientific basis for operations in the field. In the absence of a Machine Shop and of facilities for visits to Mines during Session, visits to workshops and excursions during the long vacation will be taken advantage of. As far as possible, the in-

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struction in all the branches of Engineering will be of a thoroughly practical character.

The establishment of a Diploma for special qualifications in Assaying and Mining Geology, apart from the knowledge of these subjects incidental to the course in Mining Engineering is sufficiently called for by the necessity which exists for the development of the mineral wealth of the Province. Students who pass through the course necessary to obtain this Diploma will have acquired the knowledge requisite for inspecting and surveying mineral lands, as well as the ability to report accurately on the composition and value of economic minerals generally.

The importance of the study of Chemistry is now fully recognized, and in Canada through the Public Analysts and otherwise, protection is being secured to consumers, while the producers are necessarily brought to recognize its importance. The course in Chemistry will be such as to fit the student for the position of Public Analyst or of Consulting or Resident Chemist.

Secondly.—It is proposed to furnish preliminary scientific training for students entering the professions of Surveying and Medicine. The Certificate to be granted in Surveying will be attainable by one year's study, and it is intended that this should entitle its possessor to appear one year earlier for his examination as Provincial Land Surveyor.

The School of Practical Science in relation to the Medical Schools of the Province, may well supply recognized deficiencies in affording scientific training beyond what is merely necessary for a license to practice, but which should be required for a good University Degree in Medicine.

Thirdly.—It is proposed to allow persons who are desirous of instruction in any of the subjects taught in the school, to attend separate courses in these, as *special* students.

Extracts from Regulations,

*Approved by His Honour the Lieutenant-Governor in Council,
28th June, 1878.*

1. The Board to whom the internal management and discipline of the School is intrusted is composed of the Lecturers and Instructors therein, with Chairman and Secretary as nominated by the Lieutenant-Governor, in Council.
2. The academic year consists of two terms. The Michaelmas Term extends from 1st October to 23rd December; the Easter Term from 8th January to 18th April.
3. A Diploma entitling to the standing of "Associate of the School," will be given to each student, who shall have completed, to the satisfaction of the Faculty, any one of the Regular Courses of the School.
4. The Regular Course for the Diploma of the School in each Department is three years in duration.
5. Students who propose to obtain the Diploma of the School must pass an Entrance Examination in the subjects of the Intermediate High School Examination. The Board will give credit for such of these subjects as have been passed by the students at any examination for Public School Teachers of any class, or at any Matriculation Examination in any University in Ontario, or at any Terminal Examination in University College, or at the Entrance Examinations of the Law Society, or the College of Physicians and Surgeons of Ontario.
6. Certificates of attendance and standing, when satisfactory, will be issued for any separate course or group of courses, provided that the student shall have passed an entrance examination, equivalent to that for Third Class Public School Teachers' Certificates.

[This is applicable to those who take advantage of the courses for Surveyors or Medical Students.]

- 7. At the conclusion of each term, examinations will be held in all the subjects taught, and prizes will be awarded for excellence in each department at the end of the session. Candidates for Diplomas and Certificates are required to enter for these.
- 8. All Regular Students are required to be in attendance at the School during the whole of each term, unless exempted by special permission of the Board. 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 Board for bad conduct, and adjudged guilty thereof.
- 9. Students of the School of Practical Science shall attend such courses of Lectures as are delivered by the Professors of University College to the students thereof, so far as applicable to both classes of students, while instruction of a practical character in the Department of Engineering is specially appointed for students of the School.
- 10. Special students may be permitted to attend such lectures or courses of instruction, or of practical work as the Board may think proper.

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Regular Courses for the Diploma.

See especially regulations, 3, 4, 5, 7, pp. 6 and 7.

The Fees (payable through the Secretary to the Provincial Treasurer) for instruction in any of the Departments are as follows:

- First Session: Thirty Dollars.
- Second Session: Forty Dollars.
- Third Session: Fifty Dollars.

These are payable in two instalments, one at the beginning of each term. There is no extra fee for the Diploma.

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

- (1) Engineering (Civil, Mechanical and Mining).
- (2) Assaying and Mining Geology.
- (3) Analytical and Applied Chemistry.

(1.) DEPARTMENT OF ENGINEERING.

This Department is intended to afford the necessary preliminary preparation to students intending to enter the various professional branches of Engineering.

During the first year the course is common to the students of all three branches (Civil, Mechanical, and Mining). At the commencement of the second year the student will select the branch which he intends to specially pursue and the studies of the second and third years will be arranged in conformity therewith.

SUBJECTS OF THE FIRST YEAR :

PURE MATHEMATICS.

Euclid, Algebra, Plane Trigonometry, Analytical Geometry of two dimensions.

APPLIED MATHEMATICS.

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

DRAWING.

Geometrical Model Drawing.
Map and Topographical Drawing.
Colouring and Lettering.
Orthographic, Isometric and Perspective Projections.

SURVEYING AND LEVELLING.

Field and Office Work.—Chain, Compass and Theodolite Surveys.—Levelling, Plotting, Mensuration.

CHEMISTRY.

General Chemistry.
Practical do.

FRENCH OR GERMAN.

SUBJECTS OF THE SECOND YEAR :

PURE MATHEMATICS.

Differential and Integral Calculus.
 Analytical Geometry of three dimensions.
 *Spherical Trigonometry.

APPLIED MATHEMATICS.

† Hydrostatics.
 *Geometrical Optics.
 *Plane Astronomy.

EXPERIMENTAL PHYSICS.

DRAWING.

Subjects of First Year continued.
 Descriptive Geometry.
 Machines and Constructions.

ENGINEERING.

*Surveying, Levelling and Setting-out work.
 *Practical Astronomy and Principles of Geodesy.
 Applied Mechanics.
 Theory of Strength of Materials.
 Principles of Mechanism.
 Materials of Construction.
 Methods and processes.

CHEMISTRY.

General Chemistry and Qualitative Analysis.

MINERALOGY AND GEOLOGY.

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

FRENCH OR GERMAN.

* Civil and Mining Engineering only.
 † Mining Engineering only.

SUBJECTS OF THE THIRD YEAR.

APPLIED MATHEMATICS.

Rigid and Hydro-dynamics.
Thermo-dynamics.

EXPERIMENTAL PHYSICS.

DRAWING.

Subjects of previous Years continued.
Shades and Shadows, Stone Cutting, Principles of Mechanism.

ENGINEERING.

Subjects of previous Years continued.
Applications of principles to Engineering Constructions and
Machines, *e.g.*, Foundations, Retaining Walls, Arches, Roofs,
Bridges, Roads, Railways, Canals, Sewers, Water-wheels, Steam
Engines, Hydraulic Machinery, Mining Machinery, etc.

CHEMISTRY (APPLIED).

Of Iron and Steel, Mortars and Cements, and Materials of
Construction in general.

MINERALOGY AND GEOLOGY.

Economic Minerals of Ontario.
Blowpipe Analysis and Determinative Mineralogy.
†Assaying and Mining Geology.
†Crystallography and Palaeontology.

FRENCH OR GERMAN.

† Mining Engineering only.

(2.) DEPARTMENT OF ASSAYING AND MINING GEOLOGY.

In this Department the student is fully prepared in all the methods of analysis necessary to render him a competent Assayer. He is also qualified to survey and report upon the value of mineral lands.

SUBJECTS OF FIRST YEAR:

1. Elementary Mathematics, including Mensuration and Plane Trigonometry.
2. Elements of Natural Philosophy, including Mechanics and Hydraulics.
3. Inorganic Chemistry.
4. Elementary Mineralogy and Blowpipe Practice.
5. Elementary Biology.
6. Physical Geography, Paleontology and Geology.
7. Drawing.

SUBJECTS OF SECOND YEAR:

1. Higher Mathematics, including Spherical Trigonometry, etc.
2. Chemistry, with laboratory practice in Qualitative Analysis.
3. Blowpipe Analysis and Determinative Mineralogy.
4. Geology and Economic Minerals of Canada.
5. Surveying and Levelling.

SUBJECTS OF THIRD YEAR:

1. Quantitative Chemical Analysis.
2. Metallurgy.
3. Assaying.
4. Study of Metallic Veins and other Mineral Deposits, Mining Calculations, Examinations of Mineral Lands.

(3.) DEPARTMENT OF ANALYTICAL AND
APPLIED CHEMISTRY.

This course is intended to render the student proficient in all the methods of Analytical Chemistry, and to fit him for such positions as that of Public Analyst, Consulting Chemist in regard to manufactures, or Resident Chemist in manufactories where such is required.

SUBJECTS OF FIRST YEAR :

1. Mathematics and Plane Trigonometry.
2. Natural Philosophy with work in the Laboratory.
3. Elementary Biology.
4. Elementary Chemistry with work in the Laboratory.

SUBJECTS OF SECOND YEAR :

1. Elementary Mineralogy and Geology.
2. Blowpipe practice and Assaying.
3. Laboratory work in Qualitative, Quantitative and Volumetric Analysis.

SUBJECTS OF THIRD YEAR :

1. Applied Chemistry.
 2. Organic Chemistry.
 3. Laboratory Work, including Technical Analysis, Quantitative Mineral Analysis, a prescribed course in Physiological Chemistry, and in Chemistry in its relations to Hygiene and Forensic Medicine.
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DOMINION AND PROVINCIAL LAND SURVEYORS.

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

The attention of Candidates for the certificate in Higher Surveying, given by the Dominion Board of Examiners, is directed to the facilities afforded for preparation in the School.

NOTE.—The above applies to those taking the regular course for the Diploma of the School as well as to those who obtain the special Certificate in Surveying.

COURSE FOR THE CERTIFICATE IN SURVEYING.

The Course requires one academic year for its completion. The fee for the course is \$40. See especially Regulations 6 and 7.

The following are the subjects of instruction, in all of which except French and German, an examination must be passed by the student before the Certificate is granted to him :

MATHEMATICS,	GEODESY AND ASTRONOMY
SURVEYING AND LEVELLING,	MENSURATION,
MINERALOGY AND GEOLOGY,	FRENCH,
DRAWING,	GERMAN.

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COURSES SUITABLE FOR MEDICAL STUDENTS.

In arranging the synopsis which follows, the Board has been guided by the new Medical Curriculum of the University of Toronto. The Board proposes to provide instruction in all the extra-professional and more purely scientific studies there laid down, and it does so in the hope that Medical Students may be able to take advantage of the commodious laboratory accommodation which is provided in each Department, and acquire that personal familiarity with the use of Physical and Physiological apparatus which forms such an admirable training for the scientific medical man.

Separate certificates of attendance are given for each course—didactic and practical. The courses, as to duration, comply with the regulations of the University of Toronto.

No fees are charged for the lectures if taken along with the practical courses. The Fee for each practical course is \$10. See Regulations 6 and 7.

DEPARTMENT OF CHEMISTRY.

A. LECTURES.

1. Course on Inorganic Chemistry and Chemical Physics.
2. Course on Organic Chemistry.

B. PRACTICAL COURSES.

1. Elementary Laboratory Practice.
2. Physiological Chemistry.
3. Chemistry in relation to Hygiene and Forensic Medicine.

DEPARTMENT OF BIOLOGY.

A. LECTURES.

1. Elementary Botany.
2. " Zoology.
3. Comparative Anatomy of Vertebrata.

B. PRACTICAL COURSES.

1. Elementary Biology with practical Botanical Demonstrations.
 2. Histology.
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Synopsis of the Courses of Lectures

AND PRACTICAL INSTRUCTION GIVEN IN EACH
DEPARTMENT,

WITH FEES FOR SPECIAL STUDENTS.

N.B.—Students who take the Practical Courses may attend the Lectures free of charge.

I. ENGINEERING.

(I.) DRAWING.

Model Drawing, Machines and Constructions, Map and Topographical Drawing, Designs and Estimates.

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

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

Binns' Orthographic Projection.

Church's Descriptive Geometry.

Warren's Stone-Cutting.

MacCord's Lessons in Mechanical
Drawing.

Fee for Special Students, \$10.00.

(II.) SURVEYING AND LEVELLING.

LAND SURVEYING—

Chain Surveys.

Compass and Theodolite Surveys.

Methods of keeping Field Notes.

Determination of Distances and Areas.

Determination of the Meridian, Local Time and Latitude.

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, Discharge of Streams, etc.

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

Text Books.—Gillespie's Land and Higher Surveying.

Fee for Special Students, \$10.00.

(III.) GEODESY AND PRACTICAL ASTRONOMY.

(Only the more elementary work under this head will be obligatory.)

Field work.
Calculation of the Triangles.
Projections of the Sphere.
Methods of determining Latitude, Local Time, Direction of the Meridian, and Difference of Longitude.
Theory of the Instruments.

Text Books.—Gillespie's Higher Surveying.

Chauvenet's Spherical and Practical Astronomy.
Fee for Special Students, \$15.00.

STATICS—

THEORY

DESIGN
Wal

DYNAMIC

STRENGTH

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(IV.) APPLIED MECHANICS.

STATICS—

The calculation of the Stresses in Framed Structures, Solid Beams, Stone Arches, etc. Both Graphical and Analytical Methods used.

THEORY OF THE STRENGTH OF MATERIALS.

DESIGNING OF STRUCTURES in Timber, Iron and Masonry, Arches, Retaining Walls, Foundations, Roofs, Bridges, etc.

DYNAMICS—

Representation and Measurement of Motions.

Principles of *Work* and *Energy*.

Efficiency of Machines. Friction.

Transmission of Work,—Belts, Shafts, Crank and Connecting rod, etc.

Fly-wheels, Governors.

Balancing of Machinery.

Etc., etc.

STRENGTH OF THE PARTS OF MACHINES.

HYDRAULICS—

Water Power, Flow of Water in Pipes and Channels. Water-wheels, Turbines, Pumps.

THERMO-DYNAMICS AND THEORY OF THE STEAM ENGINE.

Text-books and Books of Reference.—V. Ott—Graphic Statics.

DuBois—Graphical Statics.

Wood—Resistance of Materials.

“ Bridges and Roofs.

Rankine—Applied Mechanics.

Rankine—Steam Engine and other Prime Movers.

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Text-books, etc., Continued.—Galbraith—Manual of the Steam Engine.

Kutter—Hydraulic Tables.

Fee for Special Students, \$15.

(V.) PRINCIPLES OF MECHANISM.

Classification of the parts of Machines and their motions, Pitch Surfaces, Spur Wheels, Bevel Wheels, Skew-bevel Wheels, Trains of Wheelwork, Teeth of Wheels, Cams, Cranks, Eccentrics, Links, Bands and Pulleys, Hydraulic Connections, Frictional Gearing, Link motion for Slide Valves, etc., etc.

Text-books and Books of Reference.—Rankine—Machinery and Millwork.

Camus—Teeth of Wheels.

MacCord—Slide Valve and Eccentric.

Goodeve—Elements of Mechanism.

Fee for Special Students, \$15.

The foregoing comprises the work to which the lectures and practical instruction will be principally confined. In addition the Student will be required to obtain by reading and observation during his course a certain amount of information regarding the processes and details of Engineering Works as below :

(VI.) ENGINEERING WORKS.

Roads and Bridges.

Canals and Harbours.

Water and Sewage Works.

Manufacture of Iron and Steel.

Manufacture of Mortars and Cements.

Workshop and Foundry Practice.

Mining Machinery and Processes.

Since information on these subjects is given in a plain and intelligible manner in the various treatises relating thereto, and which can always be consulted by the engineer when engaged in the actual practice of his profession, it has not been deemed expedient that much time should be given to them in the School.

(VII.) MATHEMATICS.

The Pure Mathematics included in this course will be taught in University College.

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

(VIII.) THESIS.

A subject will be given at the end of each session on which the student will be required to write a Thesis (accompanied with drawings and specifications when necessary) during the subsequent vacation, the value of which shall be taken into account in determining his standing at the next following examination.

II. CHEMISTRY.

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

COURSES OF LECTURES.

1. Elementary Inorganic Chemistry and Chemical Physics.

Text-books.—Roscoe,
Fownes,
Bloxam,
Wilson,
Miller.

2. Organic Chemistry.

Text-books.—Fownes,
Wöhler,
Armstrong.

3. Applied Chemistry.

Text-books and Books of Reference.—Wagner's Technology,
Watts and Richardson.

PRACTICAL COURSES.

1. Preparation of Chemical Compounds.

Text-book.—Madan & Harcourt's Practical Chemistry.

Fee, \$10.

2. Qualitative Analysis.

Text-books.—Fresenius' Qualitative Analysis,
Croft's Course of Practical Chemistry.

Fee, \$10.

3. Quantitative Analysis.

Text-books and Books of Reference.—Fresenius' Quantitative Analysis,
Thorpe's Quantitative Analysis,
Blyth's Practical Chemistry,
Bolley's Technologie,
Wanklyn's Works,
Sutton's Volumetric Analysis,
Fleischer's Volumetric Analysis.

Fee, \$50.

4. Elementary Practical Course.

Text-book.—Bloxam's Laboratory Teaching.

Fee, \$10.

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5. Physiological Chemistry.

Text-book.—Hand-book for the Physiological Laboratory, Dr. Lauder-Brunton, pp. 421, 572.

For Reference.—Hoppe-Seyler,
Neubauer und Vogel.

Fee, \$10.

6. Chemistry in relation to Hygiene and Forensic Medicine.

Text-book.—Taylor's Medical Jurisprudence.

For Reference.—Otto's Ausmittelung der Gifte,
Dragendorff's Manuel de Toxicologie,
Gautier's Chimie appliquée à l'hygiène,
etc.

Fee, \$10.

For Regular Students going out in this department, a considerable part of the third year will be spent in individual laboratory practice under the direction of the Professor.

III. MINERALOGY AND GEOLOGY.

COURSES OF LECTURES (in University College).

1. Elementary Course.—Embracing Rudiments of Mineralogy, Physical Geography, Geology and Paleontology.

Text-books and Books of Reference.—Page's Physical Geography.

Johnston's Elementary Physical
Atlas.

Chapman's Mineralogy and Geology
of Canada, 2nd edition.

Dana's Manual of Mineralogy.

Dana's Text Book of Geology.

2. Advanced Course.—Mineralogy and Crystallography.
 Geology and Paleontology.
 Mathematics of Crystallography.
 Physical Geography.
 Geology and Paleontology of Canada.

Text-books and Books of Reference.—Chapman's Heads of Lectures.
 Dana's System of Mineralogy.
 Chapman's Outline of the Geology
 of Canada, 1876.
 Nicholson's Paleontology.

PRACTICAL COURSES (in School of Science).

1. Blowpipe Practice.—Chapman's Outline of Blowpipe Practice.
 Fee, \$10.
2. Blowpipe Analysis (Platner's Treatise), Determinative Mineralogy
 (Brush or von Kobell's tables). Economic Minerals of Ontario.
 Kerl's Leitfaden bei qual. u. quant. Löthrohr-Untersuchungen, 2te
 Aufl.
 Fee, \$15.
3. Assaying.—Mitchell's Assaying, by Crooks.
 Kerl's Probirkunst.
 Fee, \$50.
4. Mining Geology.—Chapman's Synopsis of Mining Geology.
 Fee, \$20.

IV. BIOLOGY.

LECTURES (in University College).

1. Elementary Biology inclusive of Rudiments of Animal and Vegetable
 Morphology and Physiology.

Text-books.—Thomé's Botany,
 Huxley's Physiology,
 McAllister's Animal Morphology.

2. Cryptogamic Botany: a short course.

Text-book.—Sachs' Text-book of Botany.

3. Zoology.

Text-books.—Huxley's Invertebrata,
Claus' Zoologie,
Gegenbaur's Manual of Comparative
Anatomy.

4. Comparative Anatomy of Vertebrata.

Text-book.—Huxley's Vertebrata.

For reference.—Owen's Vertebrata.

For diagnosis.—Jordan's Manual of American Vertebrates.

PRACTICAL COURSE (in School of Science).

1. Elementary Practical Biology, with the use of the Microscope and the study of Animal and Vegetable Tissues.

Text-books.—Huxley & Martin's Biology.
Rutherford's Histology.

2. Advanced Course.

Text-book.—Rolleston's Forms of Animal Life.

3. Specialised Course for Study of Vertebrate Anatomy.

Works of Reference.—Foster and Balfour's Elementary Embryology.
Morphology of the Skull, Parker and Bettany.

(Various standard works of reference in connection with above courses may be found in the Laboratory, as Carus' *Icones Zootomicæ*; Bronn, *Classen und Ordnungen*; etc.)

4. Histology for Medical Students.

Works of Reference.—Descriptive.—Strickers' Manual of Histology.

Frey's Histology and Histo-chemistry.

Technical.—Klein, Handbook for Physiological Laboratory, pp. 1—163.

Rutherford, Histology.

V. MATHEMATICS AND NATURAL PHILOSOPHY.

The ordinary Course embraces Euclid, Algebra, Plane Trigonometry, Statics of Solids and Fluids, Dynamics of a Particle, Geometrical Optics, Sound, Heat, and Plane Astronomy.

The Lectures in Natural Philosophy will be fully illustrated by experiments.

The Advanced Course embraces Spherical Trigonometry, Analytical Geometry (Plane and Solid), Differential and Integral Calculus, Theory of Equations, Statics of Solids and Fluids, Particle and Rigid Dynamics, Hydrodynamics, Optics, Acoustics, Thermodynamics, Astronomy.

PHYSICAL LABORATORY.

The Physical Laboratory is furnished with a large collection of instruments of precision for testing the laws of Dynamics, Sound, Light and Heat. Students who take the Advanced Course will here have an opportunity of gaining a practical acquaintance with the processes required for the determination of a large number of physical constants, and with the modes of conducting experiments generally in the above Departments.

MODERN LANGUAGES.

The classes of French and German in University College (see regulation 9), are open free of extra charge to the Students of the Regular Courses. No special examinations are held in these languages, 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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LIBRARIES, MUSEUMS, &c.

The Library of the school is well provided with works bearing upon the more technical parts of the Regular Courses. It is furnished with a full set of Specifications of Inventions from the British and Canadian Patent Offices.

It is open to Regular Students under certain restrictions imposed by the Board.

The Library, Museums and Herbarium of the University of Toronto are open to Regular Students.

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