1966

University of Windsor Graduate Calendar 1966-1967

University of Windsor

University of WINDSOR

FACULTY OF
GRADUATE STUDIES

1966 - 1967

UNIVERSITY OF WINDSOR

WINDSOR, ONTARIO, CANADA

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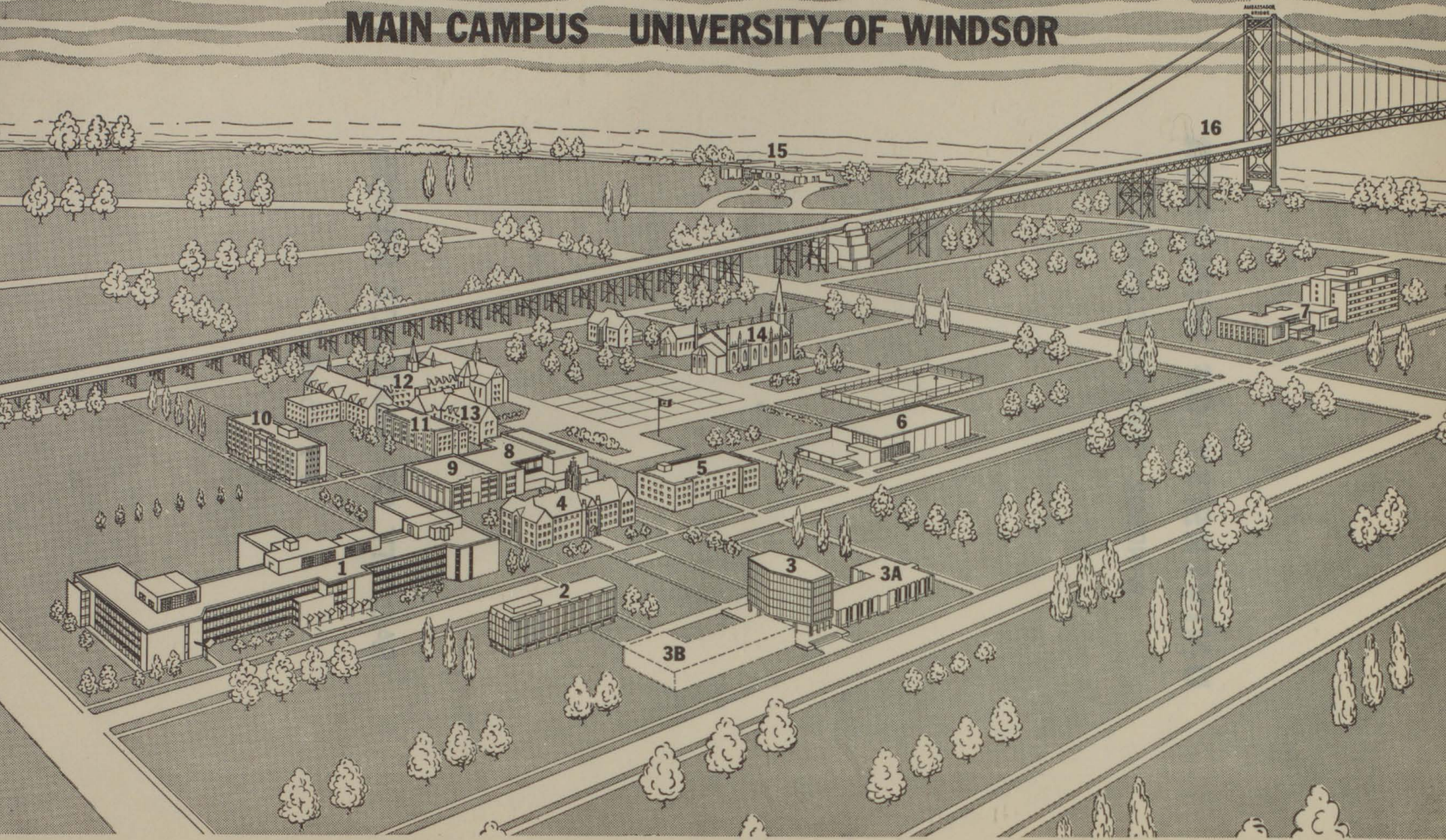
FACULTY OF GRADUATE STUDIES

1966-67

MAIN CAMPUS UNIVERSITY OF WINDSOR



MAIN CAMPUS — UNIVERSITY OF WINDSOR

1 Essex Hall (Engineering, Mathematics, Chemistry, Physics; 1961-64)

2 Biology Building (1965)

3 Windsor Hall (Administration Tower; 1965)
(a) North Academic Wing (1965)
(b) South Academic Wing (1967)

4 Dillon Hall (classrooms; 1928)

5 Memorial Science (1948)

6 University Library (1958)

7 Electa Hall (Women's residence; 1958-63)

8 University Centre (1962)

9 St. Denis Hall (gymnasium and swimming pool; 1915, 1948)

10 Cody Hall (Men's residence; 1962)

11 St. Michael's Hall (Men's residence; 1915)

12 Assumption University (1857)

13 Canterbury College (Anglican college's temporary residence)

14 Assumption Church (1748)

15 La Pointe (Basilian Fathers' House of Studies; 1965)

16 Ambassador Bridge to Detroit, Mich.

Not Shown: Holy Redeemer College
(National Redemptorist Seminary; 1958; on Highway 3)

THE UNIVERSITY OF WINDSOR

is a full member of

The University Matriculation Board of Ontario
The Association of Universities and Colleges of Canada
The Association of Commonwealth Universities
The International Association of Universities

1966

JANUARY 1966

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SEPTEMBER 1966

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OCTOBER 1966

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1967

JANUARY 1967

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MARCH 1967

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APRIL 1967

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JUNE 1967

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JULY 1967

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OCTOBER 1967

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NOVEMBER 1967

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DECEMBER 1967

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ACADEMIC CALENDAR

1966

July 4, Monday, to August 13, Saturday (inclusive)	— Summer Session
August 15, Monday, to August 17, Wednesday (inclusive)	— Supplemental Examinations
September 6, Tuesday, to September 8, Thursday inclusive)	— Night School Registration, University Centre, 7:00-9:00 p.m.
September 9, Friday	— Late registration penalty for Night School begins — $5.00
September 14, Wednesday	— Undergraduate lectures begin
September 15, Thursday	— Counselling for graduate students
September 16, Friday	— Registration for graduate day division
September 19, Monday	— Graduate lectures begin
September 21, Wednesday	— Night School Registration (late) Extension Office, 7:00-9:00 p.m.
October 5, Wednesday	— Last day of registration for Fall session
October 5, Wednesday	— Night School Registration (late) Extension Office, 7:00-9:00 p.m.
October 10, Monday	— Thanksgiving Day (no classes)
October 19, Wednesday	— Senate Meeting
October 22, Saturday	— Fall Convocation
December 17, Saturday	— Christmas recess begins

1967

January 6, Friday, to January 10, Tuesday (inclusive)	— Mid-year final examinations
January 6, Friday, to January 10, Tuesday (inclusive)	— Night School Second Semester Registration, Windsor Hall, Extension Office, 6:00-8:00 p.m.
January 11, Wednesday	— Lectures resume
January 11, Wednesday	— Late registration penalty for Night School begins — $5.00
February 1, Wednesday	— Last day of registration for second semester
February 13, Monday	— Senate Meeting
March 23, Thursday, to March 27, Monday (inclusive)	— Easter recess
April 11, Tuesday	— Last day of lectures
April 19, Wednesday	— Spring final examinations begin
June 2, Friday	— Senate Meeting
June 3, Saturday	— Spring Convocation
July 3, Monday, to August 12, Saturday (inclusive)	— Summer Session
August 14, Monday, to August 16, Wednesday (inclusive)	— Supplemental examinations

TABLE OF CONTENTS

UNIVERSITY OF WINDSOR

BOARD OF GOVERNORS

Member ex officio:

J. Francis Leddy, D.Phil., D.Litt., D.es L., LL.D., D.C.L., **Vice-Chancellor and President**

Elected Members:

John J. Stuart, B.Comm., **Chairman**
H. Clifford Hatch, **Vice-Chairman**
Anthony F. Fuerth, K.S.S., **Chairman, Executive Committee**
Wm. A. Cowan, Q.C.
Very Rev. Charles F. DeVine, C.Ss.R., S.S.L.
Eli C. Goldin, LL.D.
William T. Grant, B.Comm.
William D. Howison, B.A., F.C.A.
Gordon E. Hunt
Raymond J. Lyons
G. Malcolm Morton, B.A., M.D., M.Sc., F.R.C.S.(C), **F.A.C.S.**
Frederick R. Palin, C.A., F.C.A.
Edwin R. Rowzee, M.Ch.E., D.Sc.
Ronald W. Todgham
William R. Waddell, M.D., F.R.C.P.
George R. Weller
John W. Whiteside, B.A.

Members Appointed by Assumption University:

Rev. Cornelius P. Crowley, C.S.B., Ph.D.
Rev. D. T. Faught, C.S.B., M.A.
Rev. A. R. Howell, C.S.B., M.A.Sc.
Rev. Daniel J. Mulvihill, C.S.B., Ph.D.
Rev. Norbert J. Ruth, C.S.B., M.A.
Miss Helen McTague, Q.C.

Members Appointed by the Alumni Association:

Joseph R. Deane, LL.B.
James A. Holden, B.A.

Members Appointed by the Lieutenant Governor in Council:

Alphonse Gignac
Richard A. Graybiel, B.A.
Jerome R. Hartford, B.A.
Clare R. MacLeod, B.A., B.Paed.

ASSUMPTION UNIVERSITY

Federated with the University of Windsor

Rev. Daniel J. Mulvihill, C.S.B., B.A., M.A., Ph.D., **President**
Rev. Timothy Hogan, C.S.B., B.A., M.A. (Theol.), *Chaplain*

BOARD OF GOVERNORS

Rev. Daniel J. Mulvihill, C.S.B., Ph.D., **President and Superior.**
Rev. Donald T. Faught, C.S.B., M.A., **First Councillor.**
Rev. Norbert J. Ruth, C.S.B., M.A., **Second Councillor and Secretary.**
Rev. A. R. Howell, C.S.B., M.A.Sc., **Treasurer.**
Rev. C. P. Crowley, C.S.B., Ph.D.
Rev. J. M. Hussey, C.S.B., M.A.
Rev. E. C. Pappert, C.S.B., Ph.D.

HOLY REDEEMER COLLEGE

BOARD OF DIRECTORS, OFFICERS

Very Rev. Charles F. DeVine, C.Ss.R., S.S.L., **Principal,** *President.*
Very Rev. John D. Lockwood, C.Ss.R., *Vice-President.*
Very Rev. William D. Murphy, C.Ss.R., B.es L., *Secretary-Treasurer.*

CANTERBURY COLLEGE

The Rev. Frederick Temple Kingston, B.A., M.A., L.Th., B.D., D.Phil., **Principal**
The Rev. William N. Christensen, B.A., S.T.B., *Chaplain*

BOARD OF DIRECTORS

The Right Reverend George N. Luxton, B.A., B.D., LL.D., D.D., Bishop of Huron, *Chairman.*
L. F. Ounsworth, M.Sc., *President.*
W. Glyn Rogers, *First Vice-President.*
Mrs. T. Walker Whiteside, *Second Vice-President.*
A. E. Garrioch, *Secretary.*
The Ven. M. C. Davies, B.A., Archdeacon of Essex.
The Rev. Canon R. C. Brown, M.A., D.D.
The Rev. Canon R. S. Rayson, M.A., S.T.B., D.D.
The Rev. Canon Bertram A. Silcox, B.A., L.Th.
The Rev. Canon J. G. Lethbridge, B.A., B.D., B.S.W.
The Rev. F. T. Kingston, M.A., L.Th., B.D., D.Phil.
The Rev. Derwyn D. Jones, B.A., L.Th.
Luther C. Clarke, B.A.
R. R. Easton, B.A., Q.C.
J. R. W. Gwynne-Timothy, M.A., D.Phil.
Gordon E. Hunt
Maurice O'Beay
Warwick Plumb
W. Glyn Rogers
Thomas L. Wickett, B.A.

IONA COLLEGE

The Rev. John Charles Hoffman, B.A., B.D., Ph.D., S.T.M., Th.D., **Principal**
The Rev. B. E. McEachern, B.A., B.Div., Th.M., Th.D., *Chaplain*

BOARD OF DIRECTORS

William A. Cowan, B.A., Q.C., *President*
Rev. Samuel R. Henderson, B.A., B.D., *Vice-President*
Joseph Ord, B.A., *Secretary*
W. Gordon Neely, *Treasurer*
Rev. William E. Aldworth
Rev. William Bell, B.A.
Grant R. McCready, B.A.
Rev. Bruce Suitor
G. Alan Buchanan, B.A.
Mrs. Fred A. Burr, B.A.
Rev. W. Burton Crowe, B.A.
William J. Haydon, M.A.
Rev. J. Carman Hazelwood, B.A.
Rev. David Irvine, B.D.
Rev. Warren Langille, B.A., D.D.
Rev. J. Delmar Martin, B.A.

THE SENATE

Members ex officiis:

The Vice-Chancellor and President, *Chairman*
The Registrar, *Secretary*
The Executive Vice-President
The Academic Vice-President
The Dean and Associate Deans of each Faculty
The Director of each School
The Academic Heads of affiliated or federated Colleges
The Director of Student Affairs
The Director of Extension
The Librarian
The Head or Chairman of each Department in the Faculties of Arts and Science and Applied Science

Elected Members:

Two members from the teaching staff of each Faculty, as follows:

Faculty of Arts and Science	— J. F. Callaghan, C.S.B., M.A. M. L. Peters, Ph.D.
Faculty of Applied Science	— J. T. Laba, M.A.Sc. G. V. Venkatesulu, M.S.E.E.
Faculty of Business Administration	— M. D. Beckman, M.B.A. C. M. Birch, Ph.D.
Faculty of Graduate Studies	— E. D. Briggs, Ph.D. S. N. Kalra, Ph.D.

Appointed Members:

Two members appointed by the Alumni Association, as follows:
Michael Zin, Ph.D. (to October 1966)
Leon Z. McPherson, Q.C. (to October 1967)

OFFICERS OF ADMINISTRATION

Chancellor
Lieut. Col. the Hon. John Keiller Mackay, D.S.O., V.D., Q.C., D.C.L. (New Brunswick), LL.D. (St. Francis Xavier, Ottawa, Dalhousie, Western Ontario, Toronto).

Vice-Chancellor and President
John Francis Leddy, M.A. (Sask.), B.Litt., D.Phil. (Oxon.), D.Litt. (St. Francis Xavier and Ottawa, D.es L. (Laval), LL.D. (Assumption and Saskatchewan), D.C.L. (St. Mary's).

Vice-President
Frank A. DeMarco, B.A.Sc., M.A.Sc., Ph.D. (Toronto).

Dean of Arts and Science
Rev. Norbert Joseph Ruth, C.S.B., B.A., M.A. (Toronto).

Associate Deans of Arts and Science
William Gregory Phillips, B.A., M.A., Ph.D. (Toronto).
Roger Joseph Thibert, B.A. (Western Ontario), M.S. (Detroit), Ph.D. (Wayne State).

Assistant to the Dean
George Arthur McMahon, B.A. (Assumption), M.A. (Queen's).

Dean of Applied Science
James Gordon Parr, B.Sc. (Leeds), Ph.D. (Liverpool).

Dean of Business Administration
Gilbert Richard Horne, C.D., B.A. (Western Ontario), M.A., Ph.D. (Michigan).

Dean of Graduate Studies
Rev. Cornelius Patrick Joseph Crowley, C.S.B., B.A. (Toronto), M.A., Ph.D. (Michigan).

Associate Dean of Graduate Studies
Maurice Adelman, B.A.Sc., M.A.Sc., Ph.D. (Toronto).

President of Assumption University
Rev. Daniel Joseph Mulvihill, C.S.B., B.A. (Western Ontario), M.A., Ph.D. (Michigan).

Principal of Holy Redeemer College
Very Rev. Charles Frederick DeVine, C.Ss.R., S.S.L. (Inst. Pont. Bibl., Rome).

Principal of Canterbury College
Rev. Frederick Temple Kingston, B.A., M.A. (Toronto), L.Th., B.D. (Trinity), D.Phil. (Christ Church, Oxford).

Principal of Iona College
The Rev. John Charles Hoffman, B.A. (Toronto), B.D., Ph.D., S.T.M. (McGill), Th.D. (Union Theol. Sem.).

Director of the School of Nursing
Florence Martina Roach, R.R.C., Reg.N., B.Sc. (Seton Hall), R.R.L.

Director of the School of Physical Education
Pasquale J. Galasso, B.A., B.P.H.E. (Queen's), M.A. (Michigan).

Director of Athletics (Men)
Richard James Moriarty, B.A., M.A., (Assumption).

Director of Atheltics (Women)
Elizabeth Thomson

Director of Extension and Summer School
Rev. Edward Cecil Pappert, C.S.B., B.A. (Toronto), M.A. (Detroit), Ph.D. (Ottawa).

Registrar
Barbara Helen Birch, B.A., M.A. (Western Ontario).

Assistant Registrar
Marie Elizabeth Renaud (Mrs. R. A.), B.A. (Assumption).

Admissions Officer
Helen Margaret Wood, B.Sc. (McGill).

Librarian
William F. Dollar, B.A., M.A. (Western Ontario), A.M.L.S. (Michigan).

Assistant Librarian
J. Emery Kanasy, B.Sc. (Assumption), A.M.L.S. (Michigan).

Executive Assistant to the President
John Edward Thompson, M.C., B.A. (Manitoba).

Awards Officer
T. Clement White, B.A. (Queen's), B.Paed. (Toronto), LL.D. (Queen's).

Dean of Men
R. Paul Gilmor, B.A., M.A. (Assumption).

Dean of Women
Evelyn Grey McLean, B.A. (Assumption).

Alumni Secretary
To be appointed.

University Secretary
To be appointed.

University Treasurer
To be appointed.

Director of Engineering Services
Charles William Morgan, B.Sc. (Queen's), P.Eng.

THE FACULTY OF GRADUATE STUDIES

The Senate Committee on Graduate Studies

The President, the Vice-President, the Dean of Graduate Studies (Chairman), the Associate Deans of the Faculty (if any), the Registrar (Secretary), two representatives from the Faculty of Graduate Studies elected to the Senate, and representatives from each department of the University which offers graduate work, as follows:

R. G. Billinghurst, M.A.Sc., Professor of Engineering Materials.

C. M. Birch, Ph.D., Professor of Business Administration.

W. G. Colborne, M.Sc., Professor and Head, Department of Mechanical Engineering.

R. J. Doyle, Ph.D., Associate Professor and Head, Department of Biology.

Rev. C. J. Drouillard, C.S.B., Ph.D., Professor and Head, Department of Modern Languages.

Rev. D. T. Faught, C.S.B., B.A., M.A., Professor and Head, Department of Mathematics.

Rev. R. C. Fehr, C.S.B., Ph.D., Professor and Head, Department of Psychology.

A. W. Gnyp, Ph.D., Associate Professor of Chemical Engineering.

R. A. Helling, Ph.D., Associate Professor and Head, Department of Sociology and Anthropology.

J. B. Kennedy, Ph.D., Professor and Acting Head, Department of Civil Engineering.

A. E. Kovacs, Ph.D., Associate Professor, Department of Economics.

L. Krause, Ph.D., Professor and Head, Department of Physics.

Rev. D. J. Mulvihill, C.S.B., Ph.D., Professor and Head, Department of History.

Department of Philosophy. To be appointed.

E. D. Lemire, Ph.D., Associate Professor, Department of English.

R. J. Thibert, Ph.D., Associate Professor, Department of Chemistry.

P. A. V. Thomas, Ph.D., Professor and Head, Department of Electrical Engineering.

W. L. White, Ph.D., Associate Professor and Head, Department of Political Science.

Members of the Faculty
(The year of first appointment is given).

Adelman, Maurice; B.Sc., M.A.Sc., Ph.D. (Toronto). Associate Dean of Graduate Studies; Professor and Head, Department of Chemical Engineering—1956.

Atkinson, Harold R.; B.Sc. (Western Ontario), M.Sc. (Assumption), Ph.D. (Queen's). Assistant Professor of Mathematics—1964.

*Babiy, George Borys; B.Sc., M.Sc.M.E. (Manitoba). Assistant Professor of Mechanical Engineering—1959.

Benedict, Winfred Gerald; B.S.A., Ph.D. (Toronto). Professor of Biology—1957.

Billinghurst, Robert Gordon; B.A.Sc., M.A.Sc. (Toronto). Professor and Head, Department of Engineering Materials—1957.

*On leave of absence.

Birch, Cecil Mackintosh; B.A. (Western Ontario), M.A., Ph.D. (Toronto). Professor of Business Administration—1959.

Boland, Rev. Frank John, C.S.B.; B.A. (Toronto), M.A. (Detroit), Ph.D. (Ottawa). Associate Professor of History—1955.

Bounsall, Edwin J.; B.A.Sc., Chem. Eng. (Toronto), M.A. (Toronto), D.I.C., Ph.D. (Imperial College, London). Assistant Professor of Chemistry.

Briggs, Elsworth Donald; B.A. (New Brunswick), Ph.D. (London). Assistant Professor of Political Science—1963.

Brownlie, John Maxwell; B.A. (Western Ontario), M.B.A. (Michigan). Associate Professor of Business Administration—1958.

Bunt, Miriam Elizabeth; B.A. (Queen's), B.S., M.Ed., Ph.D. (Wayne State). Associate Professor in Psychology—1963.

Callagan, John E.; B.A.(Hons.) (Manchester), Ph.D. (London). Associate Professor of Psychology—1963.

Callaghan, Rev. John Francis, C.S.B.; B.A., M.A. (Toronto). Assistant Professor of Economics—1957.

Cervin, Vladimir Bohdan; B.A., B.Sc. (Vienna, Austria), D.S.S. (Brussels), Ph.D. (Prague). Professor of Psychology—1961.

Channen, Eric Wyllis; B.A.(Hons.), Ph.D. (Toronto). Associate Professor of Chemistry —1960.

Chrypinski, Vincent Casmere; M.L. (Catholic U. of Lublin, Poland), M.A. (Wayne), Ph.D. (Michigan). Professor of Political Science—1957.

Colborne, William George; B.Sc., M.Sc. (Queen's). Professor and Head, Department of Mechanical Engineering.

Courter, Richard; B.A. (Columbia University), Ph.D. (University of Wisconsin). Associate Professor of Mathematics—1965.

Crowley, Rev. Cornelius Patrick Joseph, C.S.B.; B.A. (Toronto), M.A., Ph.D. (Michigan); Dean of Graduate Studies, 1959. Professor and Head, Department of English—1944.

Cunningham, Stanley B.; B.A. (Manitoba), M.A., M.S.L. (Pont. Inst. Med. Stud.), Ph.D. (Toronto). Assistant Professor of Philosophy—1961.

Deck, John Norbert; B.A., M.A. (Western Ontario), Ph.D. (Toronto). Associate Professor of Philosophy—1957.

DeMarco, Frank A.; B.A.Sc., M.A.Sc., Ph.D. (Toronto); Vice-President. Professor of Chemistry—1946.

Dispas, Gustave-Chretein; Ph.D. (University of Louvain). Associate Professor of Modern Languages—1965.

Dougherty, Rev. John Roger, C.S.B.; B.A. (Western Ontario), S.T.B. (St. Michael's, Toronto), M.S. (Cornell). Assistant Professor of Biology—1951.

Doyle, Robert Joseph; B.A., M.A. (Western Ontario), M.S. (Michigan State), Ph.D. (Wayne State). Associate Professor and Head, Department of Biology—1948.

Drouillard, Rev. Clarence Joseph, C.S.B.; B.A., M.A. (Toronto), Ph.D. (Laval). Professor and Head, Department of Modern Languages—1956.

Eliopoulos, Hermes Andrew; B.Sc. (Salonika, Greece), M.Sc. (McGill), Ph.D. (Toronto). Professor of Mathematics—1956.

*On leave of absence.

Fallenbuchl, Zbigniew Marian; B.Sc.(Econ.) (London), M.A. (Montreal), Ph.D. (McGill). Professor of Economics—1957.

Farrell, John Kevin Anthony; B.A., M.A. (Western Ontario), Ph.D. (Ottawa), F.R.S.A. Associate Professor of History—1962.

Faught, Rev. Donald Thomas, C.S.B.; B.A. (Toronto), M.A. (Michigan). Professor and Head, Department of Mathematics—1954.

Fehr, Rev. Robert Charles, C.S.B.; B.A. (Toronto), M.A. (Detroit), Ph.D. (Fordham). Professor and Head, Department of Psychology—1951.

*Fletcher, Harold Ross; B.A.Sc., M.A.Sc. (Toronto). Associate Professor, Department of Electrical Engineering—1958.

Flood, Patrick Francis; B.A., M.A. (Western Ontario). Associate Professor of Philosophy —1945.

Gertz, John Blake; B.Sc. (Detroit), M.B.A. (Ohio State). Associate Professor of Business Administration—1957.

Gillen, William John; B.A., M.A. (Toronto). Assistant Professor of Economics—1959.

Gnyp, Alex William; B.A.Sc., M.A.Sc., Ph.D. (Toronto). Associate Professor of Chemical Engineering—1958.

Habib, Edwin Emile; B.Sc. (Birmingham), Ph.D. (McMaster). Associate Professor of Physics—1958.

Habowsky, Joseph E. J.; Diplom-Landwirt (Technische Hochschule, Munich), M.S.A., Ph.D. (Toronto). Assistant Professor of Biology—1964.

Hartt, James Paul; B.A.Sc. (Toronto), D.L.S., O.L.S., M.S.C.E. (Wayne State). Assistant Professor of Civil Engineering—1958.

Holland, William John; B.Sc. (Queen's), M.S., Ph.D. (Wayne State). Associate Professor of Chemistry—1960.

Holuj, Frank; B.Sc. (London, England), M.Sc., Ph.D. (McMaster). Assistant Professor of Physics—1961.

Horne, Gilbert Richard; C.D., B.A. (Western Ontario), M.A., Ph.D. (Michigan). Professor and Dean, Faculty of Business Administration—1931.

Howell, Rev. Arthur Robert, C.S.B.; B.Sc. (Saskatchewan), S.T.B. (St. Michael's, Toronto), M.A.Sc. (Toronto). Assistant Professor of Mechanical Engineering—1958.

Huschilt, John; B.A., M.A. (Toronto), Ph.D. (Wayne State). Associate Professor of Physics—1953.

Kalra, Surindra Nath; B.Sc. (Panjab), M.S., Ph.D. (Illinois). Associate Professor of Electrical Engineering—1962.

Kennedy, John B.; B.Sc.(Hons.) (Cardiff), Ph.D. (Toronto). Professor and Acting Head, Department of Civil Engineering—1963.

*On leave of absence.

Kingston, Rev. Frederick Temple; B.A., M.A., L.Th., B.D. (Toronto), D.Phil. (Christ Church, Oxford); Principal, Canterbury College. Professor of Philosophy—1959.

Kosicki, Rev. George Watka, C.S.B.; B.A. (Western Ontario), M.S., Ph.D. (Michigan). Associate Professor of Chemistry—1956.

Kovacs, Aranka Eve; B.A. (McMaster), M.A. (Toronto), Ph.D. (Bryn Mawr). Associate Professor of Economics—1961.

Krause, Lucian; B.Sc. (London, England), M.A., Ph.D. (Toronto), F.Inst.P. Professor and Head, Department of Physics—1958.

Kuehner, Calvin Charles; B.Sc., M.Sc., Ph.D. (Ohio State). Associate Professor of Biology —1958.

LeMire, Eugene D.; Ph.B., M.A. (Detroit), Ph.D. (Wayne State). Associate Professor of English—1962.

*McCarthy, Lillian Margaret; B.A., M.A., Ph.D. (Toronto). Professor of Modern Languages—1958.

McCurdy, Howard Douglas; B.A., B.Sc. (Western Ontario), M.Sc., Ph.D. (Michigan State). Associate Professor of Biology—1959.

MacInnis, Cameron; B.Sc. (Dalhousie), B.E.(Hons.) (Nova Scotia Technical College), Ph.D. (Durham, U.K.). Associate Professor of Civil Engineering—1963.

McKenney, Donald J.; B.Sc., M.Sc. (Western Ontario), Ph.D. (Ottawa). Assistant Professor—1964.

McNamara, Eugene Joseph; B.A., M.A. (DePaul). Associate Professor of English—1959.

Malone, Rev. John Alphonse, C.S.B.; B.A. (Western Ontario), M.A. (Toronto), Ph.D. (Fordham). Associate Professor of Psychology—1959.

Mathur, Gurucharan Prasad; B.S. (Bombay), M.S., Ph.D. (Northwestern). Assistant Professor of Chemical Engineering—1964.

Moore, Reginald Albert; B.Sc., M.Sc. (McMaster), Ph.D. (Alberta). Assistant Professor of Physics—1962.

Mulvihill, Rev. Daniel Joseph, C.S.B.; B.A. (Western Ontario), M.A., Ph.D. (Michigan); President, Assumption University. Professor and Head, Department of History—1942.

*Nelson, Ralph Carl; B.A., M.A. (DePaul), Ph.D. (Notre Dame). Associate Professor of Philosophy—1961.

Nicol, Allan; Applied Physics (Royal College of Science and Technology, Glasgow), Ph.D. (Edinburgh). Associate Professor of Mechanical Engineering—1963.

North, Walter P. T.; B.Sc. (Queen's), M.Sc. (Saskatchewan), Ph.D. (University of Illinois). Assistant Professor of Mechanical Engineering—1965.

Ogata, Hisasha; B.Sc. (Tokyo), Ph.D. (Western Reserve). Assistant Professor in Physics —1965.

O'Meara, Rev. John Patrick, C.S.B.; B.A. (Toronto), M.A. (Wayne State), Ph.D. (Ottawa). Associate Professor of History—1959.

Page, Léandre; Professeur agrégé de l'Université en Lettres at Philosophie à Paris. Associate Professor of Modern Languages—1965.

*On leave of absence.

Parr, James G.; B.Sc. (Leeds), Ph.D. (Liverpool). Professor of Engineering Materials and Dean of the Faculty of Applied Science—1964.

Petras, Michael Luke; B.Sc., M.Sc. (Notre Dame), Ph.D. (Michigan). Associate Professor of Biology—1956.

Philip, Brother Roger, F.S.C. (William James Overend); B.A., M.A. (Toronto), Ph.D. (Catholic U. of America). Professor Emeritus of Psychology—1956.

*Phillips, William Gregory; B.A., M.A., Ph.D. (Toronto). Professor and Head, Department of Economics—1950.

Pillay, Datharthry T. N.; B.Sc. (Osmania University, Hyderabad, India), M.S., Ph.D. (Cornell). Assistant Professor of Biology—1963.

Price, Stanley James Whitworth; B.A., M.Sc. (British Columbia), Ph.D. (Edinburgh). Associate Professor of Chemistry—1959.

Pryke, Kenneth G.; B.A. (Carleton), M.A., Ph.D. (Duke). Assistant Professor of History —1963.

Record, Rev. Maurice Adrian, C.S.B.; B.A. (Western Ontario), M.A. (Toronto). Associate Professor of Psychology—1952.

Robinson, David; B.Sc., M.Sc. (Queen's, Belfast), Ph.D. (Western Ontario). Associate Professor of Physics—1964.

Rothberger, Fitz; Ph.D. (University of Vienna). Professor of Mathematics.

Rutherford, Kenneth Gerald; B.A. (Western Ontario), Ph.D. (Wayne State). Professor and Head, Department of Chemistry—1958.

Rumfeldt, Robert Clark, B.Sc.(Hons.) (Loyola, Montreal), Ph.D. (Alberta). Assistant Professor of Chemistry.

St. Pierre, Carl Clifford; B.A.Sc. (Assumption), M.A.Sc., Ph.D. (Northwestern). Assistant Professor of Chemical Engineering—1964.

Sabina, Leslie Robert; A.B. (Cornell University), M.S., Ph.D. (University of Nebraska). Assistant Professor of Biology—1965.

Singh, Sankatha P.; B.Sc. (K. N. Govt. College, Gyanpur), M.Sc., Ph.D. (Banaras Hindu University). Assistant Professor of Mathematics—1965.

Sridhar, Krishnaswamy; B.Sc. (Madras, India), M.A.Sc., Ph.D. (Toronto). Assistant Professor of Mechanical Engineering—1963.

Smith, Alexander Cormac; B.Sc., M.Sc., Ph.D. (Dublin). Associate Professor of Mathematics—1963.

Smith, Alfred Arthur; B.A., M.A. (Queen's), Ph.D. (McGill). Professor of Psychology—1959.

Stager, Robert A.; B.Sc., M.A.Sc. (Toronto), Ph.D. (Illinois). Assistant Professor of Chemical Engineering—1963.

Sullivan, John Francis; B.S., M.A. (Detroit), Ph.D. (Michigan). Associate Professor of English—1958.

Szamosi, Geza; Ph.D. (Budapest), D.Sc. (Hungarian Academy of Sciences). Professor, Department of Physics—1964.

*Thibault, Albert A.; A.B. (Boston College), Licence-es-Lettres (Paris), M.A. (Harvard), Docteur-est-Lettres (Laval). Associate Professor of Modern Languages—1953.

*On leave of absence.

Thibert, Roger Joseph; B.A. (Western Ontario), M.S. (Detroit), Ph.D. (Wayne State). Associate Professor of Chemistry—1953.

Thomas, Paul Alexander Vivian; B.Sc.Eng. (London), Ph.D. (Glasgow). Professor and Head of Electrical Engineering—1962.

Tracy, Derrick S.; B.Sc. (Lucknow), M.Sc., Sc.D. (University of Michigan). Associate Professor of Mathematics—1965.

Tucker, Henry Joseph; B.Eng., M.Eng. (McGill). Associate Professor of Mechanical Engineering—1960.

Urtiaga, Alfonso; Lic. Phil., Lic. Law (Madrid), M. Comp. Law (Columbia, New York), Ph.D. (Louisiana State). Assistant Professor of Modern Languages—1963.

van Wijngaarden, Arie; B.Sc., Ph.D. (McMaster). Associate Professor of Physics—1961.

Vuckovic, Milorad Nicholas; B.A., M.A. (Assumption), Ph.D. (McGill). Associate Professor of History—1960.

Youdelis, William V.; B.Sc. (Alberta), Ph.D. (McGill). Associate Professor of Engineering Materials—1965.

Warner, Alden H.; B.A. (University of Main), M.A., Ph.D. (Southern Illinois University). Assistant Professor of Biology—1965.

White, Walter LeRoy, D.F.C.; B.A. (Western Ontario), M.A. (Toronto), Ph.D. (Michigan). Associate Professor and Head, Department of Political Science—1956.

Wood, Gordon Walter; B.Sc., M.Sc. (Mount Allison), Ph.D. (Syracuse). Assistant Professor of Chemistry—1963.

*Zakon, Elias; Mgr. Phil., Dr. jur. (Stefan Batory U., Wilno). Associate Professor of Mathematics—1957.

Zin, Michael; B.Comm. (Assumption), M.B.A. (Michigan), Ph.D. (Michigan State). Professor of Business Administration—1956.

*On leave of absence.

HISTORY OF THE UNIVERSITY OF WINDSOR

On July 1, 1963, the new, non-denominational University of Windsor inherited an educational complex founded in 1857 as Assumption College, developed since 1870 by the Basilian Fathers (the Congregation of St. Basil), and expanded to Assumption University in 1953. The transition from an historic Roman Catholic university to a non-denominational institution was unprecedented.

The new institution included Assumption University as a federated member, operating residences on campus for men and women and holding in abeyance its degree-granting powers except in the graduate Faculty of Theology. All of the facilities and teaching faculty of Assumption University were absorbed in the University of Windsor, as were those of its federated, non-denominational Essex College, which ceased to exist.

Heritage

Assumption College opened its doors on February 10, 1857, largely through the efforts of Rev. Pierre Point, S.J., pastor of Assumption Parish in Sandwich, established as a mission in 1748 and made a parish in 1767, the oldest in Canada west of Montreal. M. Theodule Girardot was the first instructor. The College was incorporated by an Act of the Legislature of the Province of Canada which received Royal Assent August 16, 1858, during the Superiorship of Rev. Joseph Malbos, a Basilian who guided it for one year. Successively, the College was directed by Jesuits, Benedictines and secular clergy until the Basilians returned in 1870.

During the early years, the curriculum consisted of classical and commercial courses providing a complete high school and Arts course, primarily designed to prepare students for theological seminaries, although many alumni entered business and professional spheres. In 1919, Assumption affiliated with Western University, London, Ontario (now the University of Western Ontario), as an integral part of the latter's Faculty of Arts and Science with a broadened curriculum including General and Honours Courses in Arts and Science leading to Bachelor of Arts and Bachelor of Science degrees, graduate work in Philosophy leading to the Master of Arts degree, and pre-professional programs such as pre-engineering, pre-medicine and pre-law.

From 1934 to 1962, Holy Names College, conducted by the Sisters of the Holy Names of Jesus and Mary, enabled Assumption to become co-educational. Then the Sisters disbanded the College, while continuing to teach at the University, and Assumption took over its women's residence which was re-named Electa Hall.

University Development

On July 1, 1953, Assumption ended its affiliation with the University of Western Ontario and obtained its own university powers through an Act of the Ontario Legislature. In 1954 it was admitted to full membership in the

National Conference of Canadian Universities and Colleges, to the University Matriculation Board of Ontario, and to the Association of Universities of the British Commonwealth.

In 1956, the College became Assumption University by an Act of the Ontario Legislature, and accepted as an affiliate the non-denominational Essex College, incorporated in 1954, which assumed responsibility for the Faculty of Applied Science, the Schools of Business Administration and Nursing, and the Departments of Biology, Chemistry, Geology and Geography, Mathematics, and Physics. Holy Redeemer College, national seminary of the Redemptorist Fathers, located three miles off campus, also affiliated. In 1957, Canterbury College, offering courses in Philosophy, Religious Knowledge and Medieval History, became the first Anglican college in the world to affiliate with a Roman Catholic university.

Recent Expansion

The University of Windsor was incorporated by the Ontario Legislature on December 19, 1962, accepting Assumption University in federation. During 1963 and 1964, affiliation agreements were made with Holy Redeemer College, Canterbury College and the new Iona College (United Church of Canada), the latter two sponsoring student residences and chaplains. A notable innovation in 1963-64 was the establishment of an inter-denominational, undergraduate Department of Theology, presently offering courses in three theologies (Anglican, Roman Catholic and United Church, but available to others as the need arises, and supported by Provincial Government funds.

The University of Windsor assumed control of the campus on July 1, 1963, and became a member of the International Association of Universities in June, 1964. Rev. E. C. LeBel, C.S.B., first President and Vice-Chancellor of the University of Windsor, was succeeded on July 1, 1964, by Dr. J. F. Leddy, who had been Vice-President (Academic) of the University of Saskatchewan. A general expansion of the Faculty of Graduate Studies was accelerated in the academic year, 1964-65. The School of Business Administration became the Faculty of Business Administration in 1965.

A new language laboratory is the largest of its kind in Canada. A new School of Physical Education offers B.P.H.E. and B.P.E. programs. Experimental closed-circuit TV lectures were started, and a new Biology Building was opened in 1966.

Presidents: 1963-64: Rev. Eugene Carlisle LeBel, C.S.B., C.D., LL.D.

1964- : John Francis Leddy, D.Phil., D.Litt., D.es L., LL.D., D.C.L.

GENERAL INFORMATION

University Library

The present University Library was completed in 1958. Modular in plan, it is 90 feet wide, 190 feet long, and four stories high. It provides shelving for 350,000 volumes and has a seating capacity of five hundred. The open stack arrangement follows the modern practice of placing readers among books.

Special library facilities for faculty and students include study carrells in the stack area, browsing and display areas, seminar rooms, faculty studies. A combined audio-visual and lecture room on the third floor provides all necessary audio-visual equipment and seating for 200 persons. Here the Library Science lectures are given and other lectures when 16 mm. films, filmstrips, pictures or book displays are required.

The Library is intended for purposes of reading and serious study; quiet must be observed at all times. Since smoking space has been provided, smoking is not allowed in the reading and reference rooms, seminar rooms or stairways. Failure to maintain a suitable standard of conduct in the Library, or failure to observe any of the Library regulations may lead to cancellation of Library privileges.

University Centre

The University Centre honours many friends of the University of Windsor who generously contributed to its construction. It is located at the centre of the University campus. In many ways it is the heart of the campus, because its activities are closely integrated with the interests and activities of the entire University family — students, faculty, alumni, and friends.

It is the goal of the University Centre staff to create a student program which will supplement and implement the University's curriculum. Social and recreational activities, so necessary to the leisure time of students, are balanced with cultural and educational programs to further assist in the intellectual development of students.

The Centre offers faculty and alumni facilities for dining, meetings, social, and cultural activities.

The University Centre contains the University bookstore and provides food service for all students of the University, resident and non-resident. There is also a private dining room for the faculty.

Christian Culture Series

Assumption University makes available to the students of the University of Windsor distinguished lecturers and artists in its Christian Culture Series. This series, established in 1934, gives Graduate students an opportunity to hear and meet men and women who are internationally outstanding in a variety of contemporary fields.

RESIDENCES FOR OUT OF TOWN STUDENTS

1. General Regulation

All Preliminary and First Year students who are not living at home or with relatives, are expected to live in a residence provided by the University or by one of its affiliated or federated Colleges, so far as facilities permit.

2. Assumption University Residences

Assumption University, under the direction of the Basilian Fathers, provides residence accommodation for both men and women students attending the University of Windsor. Cody Hall and St. Michael's Hall provide accommodation for approximately 350 men; and Electa Hall provides for approximately 230 women. The buildings are modern in every detail. Supervision of the residences is carried out through a student prefecture system. The Basilian Fathers provide chaplain service. The residences are open to students of any year and of any religious denomination. Food service is provided through arrangement with the University of Windsor at the University Centre.

The fees for the year, for board and room.....$800
A deposit of $25 must accompany the application.

Students wishing to apply for residence in Assumption University residences should apply to:

The Director of Residence
Assumption University
University of Windsor
Windsor, Ontario.

3. Canterbury College and Iona College Residences

At the present time, Canterbury College (Anglican) and Iona College (United) are planning the erection of student residences. These should be available in the Fall of 1967.

4. Off Campus Residences

The University of Windsor is situated in the centre of a large residential area, in which many of the householders are willing to offer room accommodation to students. A list of approved accommodations is available at the office of the Dean of Students. Room rental varies from $5.00 to $15.00 a week, depending upon facilities and accommodation provided.

Students wishing off campus accommodation, should write to:

The Dean of Students
University of Windsor
Windsor, Ontario.

He will provide them with a list of approved residences, and they may then make their arrangements with the homeowner.

The Graduate Student Society

The Graduate Student Society which came into being on January 30, 1964, is designed to bring together for educational and social activities graduate students from the various faculties and affiliated Colleges of the University. It aims at making the Graduate students aware of the full range of academic, cultural, and social opportunities available throughout the University.

The Society sponsors lectures by specialists in varied fields of graduate interest, with the intention of promoting interdisciplinary awareness and understanding.

Health and Insurance

The University maintains adequate first-aid stations for the treatment of minor ills. An infirmary attended by a nurse is maintained for resident students. Several excellent Windsor hospitals are located nearby for more serious accidents and illnesses.

All students are strongly urged to enrol in medical, hospitalization and accident insurance plans such as those offered by the World University Service and the Ontario Hospital Services. The University does not assume responsibility for expenses incurred as the result of injuries sustained by students on campus.

Employment and Placement

A placement bureau provides assistance in the obtaining of Summer work and permanent employment upon graduation, and to a limited extent part-time employment during the academic year. The Student Placement Bureau co-operates closely with the Civil Service Commission of Canada and the National Employment Service, which appoints a Placement Officer on campus.

The University recognizes that some students must supplement their income by part-time employment during the academic year; it wishes to point out, however, that unless such employment is kept to a minimum, both the student's health and academic standing may suffer. In any case, students who must work long hours do not derive full benefit from their university experience and may be required to take a reduced program of studies. A student in such circumstances would be better advised to obtain a loan, or alternatively to postpone his university education until such time as he can afford to devote his full time to the many facets of university life.

Religious Activities

A tradition on this campus is full appreciation of the vitalising influence of religion in student life. Students are encouraged to practise their religion, and religious services and organisations are provided for specific groups.

Roman Catholic students have daily Masses available in the Assumption Chapel, and in Assumption Church. The Canterbury Club and United Church Club foster religious programs for the Anglican and United Church students respectively.

ACADEMIC INFORMATION AND REGULATIONS

1. **Application for Admission:** Application for admission should be addressed as follows:

Office of Graduate Studies

The University of Windsor

Windsor, Ontario, Canada.

The Office of Graduate Studies will send appropriate forms and instructions. Completed forms and other documents required for admission are to be sent to the Office of Graduate Studies.

Applications for admission (full-time and part-time day) should be submitted as early as possible; those reaching the Office of Graduate Studies after July 1 may not be approved in time to permit registration in classes. If a fellowship is sought, application for admission, together with supporting documents, should reach the Office of Graduate Studies before March 15; otherwise no assurance can be given that the application for a fellowship will be considered.

Applications for admission to Graduate Studies by Extension should be submitted by September 1st otherwise no assurance can be given that an application received after that date will be given consideration. All applications must be complete by the last date of registration.

An application fee of $10.00 (Canadian Funds) must accompany **all** applications for admission to Graduate Studies at the University of Windsor. This fee is **non-refundable,** but applicable towards the student's tuition upon registration.

All applications for admission are considered by the Graduate Committee on Admissions. No application can come before this Committee unless it is supported by the following documents:

1. Two copies of the form, "Application for Admission to the Faculty of Graduate Studies," properly filled out. Overseas students need fill out only the one admission form which is found at the back of the "Information Booklet for Prospective Graduate Students from Overseas."

2. Official transcripts of all undergraduate and graduate work from all colleges or universities attended.

3. Two letters of recommendation, as indicated on the application form.

4. If required, certification of proficiency in English from the English Language Institute of the University of Michigan (see below).

5. Graduate Record Examination scores (if required).

All applicants from abroad whose mother tongue is not English are required to take the English proficiency test administered by the English Language Institute of the University of Michigan, Testing and Certification, North University Bldg., Ann Arbor, Michigan, U.S.A. No substitute for this test will be allowed. The applicant is expected to make his own arrangements for taking the test in his own locale by contacting the center in his own locale or by writing to the Institute.

Note: For information concerning the upgrading of teaching certificates to the Type A level through special honours programs see the Undergraduate Calendar.

2. **Registration:** Students whose applications for admission to graduate study have been approved for full or part-time day should present themselves for registration on the date recorded in the calendar (see p. 5). Students whose applications have been approved for admission to graduate study by Extension, should present themselves for registration on one of the dates recorded in the calendar (see p. 5). Registration will not be completed until a "Plan-of-Work" form for the current year has been approved by the Head of the Department concerned or by a designated departmental advisor. This "Plan-of-Work" form serves as a "Permit-to-Register" for **all** graduate students. It may be secured from the Department Heads or Advisors prior to the dates of registration.

Provisional Registration: A provisional registrant is one who is allowed to attend classes while his application is still under consideration. A student whose application is not complete by the regular registration period may be allowed to register provisionally. All required forms and documents must be submitted **before the last day of registration.** If the file is not complete by that date, or if the student is not eligible for admission as a credit student, he will be allowed to continue on a non-credit basis only as an audit student.

Audit Student: An audit student in any course is one who attends the course without credit towards a degree or program, and who is not entered or registered on the official University records or lists for purposes of academic or degree credit or transcript. Such a student will not be allowed to write examinations and cannot be graded in any way. He will normally pay the regular fees for the course(s) or program.

3. **Graduate Work by Extension:** Graduate programs leading to the Master of Applied Science and the Master of Business Administration are offered by Extension. In other programs, it may be possible to fulfill some or all of the requirements for a graduate degree through courses taken in the Extension Division; students should consult the Department Head or departmental advisor about the availability of complete graduate programs by Extension. All students working toward a graduate degree by Extension must be properly admitted to graduate study.

4. **Examinations:** A department may require either oral or written examinations in graduate courses. Students who miss an examination because of illness or other grave reason should notify the Office of Graduate Studies and submit supporting documents, if required, before or during the examination period. In such cases, the Dean of Graduate Studies may grant standing in the subject or subjects concerned on the basis of term marks alone.

The Departments listed below will require Graduate Record Examinations of all (old and new) students pursuing Graduate Studies. These examinations will be held about the first week in October, 1966.

The Department of Biology
The Department of Economics
The Department of English
The Department of History
The Department of Modern Languages
The Department of Philosophy
The Department of Psychology
The Department of Mathematics
The Department of Chemical Engineering
The Department of Electrical Engineering
The Department of Mechanical Engineering

M.B.A. applicants are required to take the Admission Test for Graduate Study in Business.

5. **Graduation:** In order to allow the necessary time for the printing of the diploma and the Convocation program, the candidate's completed work must be approved by the Faculty of Graduate Studies and his thesis or dissertation, if one is presented, must be received by the Library at least two weeks before Convocation.

Registration in any program does not constitute an application for a degree or diploma. An official application to graduate must be filled out and filed in the Registrar's Office at least 30 days prior to the Convocation at which the applicant hopes to graduate.

Each prospective graduate must be present in person at Convocation in order to receive his degree, unless excused for a serious reason by the Dean of Graduate Studies, and unless arrangements have been made to receive the degree *in absentia.*

THE DEGREE OF DOCTOR OF PHILOSOPHY

1. **Admission Requirements:** Graduates of the University of Windsor or of other recognized colleges or universities may apply for admission. In general, admission to graduate study is granted only to those students who have good academic records and who are adequately prepared to undertake graduate work in their field of specialization. In particular, an applicant for admission to a graduate program leading to the degree of Doctor of Philosophy must have either a Master's degree or an Honours Baccalaureate or the equivalent; his academic standing should be unquestionably superior.

Possession of the minimum requirements does not automatically ensure acceptance.

Applications will be received from students in their final undergraduate year, but acceptance will be conditional until the completed undergraduate record is submitted.

2. **Candidacy:** Admission to graduate study does not imply admission to Candidacy for a degree. Admission to Candidacy for the degree of Doctor of Philosophy is granted by the Dean of Graduate Studies, upon recommendation of the Department concerned, when a student has satisfied the requirements for Candidacy of the Faculty of Graduate Studies and of the Department, as these may be specified in Departmental listings in the Calendar. Admission to Candidacy is normally to be regarded as recognition that a student has given adequate evidence of superior capability and achievement in graduate study. A student may not be admitted to Candidacy for the degree of Doctor of Philosophy before passing a comprehensive examination in his field of specialization.

3. **Residence:** Residence requirements are intended to provide for each student an adequate contact with the University, with the faculty in his field of specialization, and with the library, laboratories, and other facilities for graduate study and research. It is expected, therefore, that every student in a program leading to the degree of Doctor of Philosophy will undertake a full program of study for a minimum of one academic year or its equivalent. Application and interpretation of the residence requirement is the responsibility of the Dean of Graduate Studies, and if a student does not expect to fulfill it in the normal way, he should submit to the Dean, in writing, his reasons for departing from the norm and secure approval for his plan, before beginning his graduate program. See also the section on "Duration of Study" below.

4. **Duration of Study:** The normal minimum duration of study for the degree of Doctor of Philosophy is three full years beyond the Honours Baccalaureate or its equivalent, or two full years beyond the Master's or its equivalent. Credit for graduate study previously undertaken may be given, but the duration of study at this University may not be reduced beyond the minimum

of two years, for the degree of Doctor of Philosophy.

5. **Time Limit:** Work on the degree of Doctor of Philosophy should be completed within seven consecutive years of the student's first enrollment. If an extension of this time limit becomes necessary, the student should address a petition to the Dean of Graduate Studies, giving his reasons for the request and plans for the completion of his work. A student who exceeds the time limit may be required to take additional qualifying examinations or additional course work, or both.

6. **Language Requirements:** Some programs require reading knowledge of a language or languages other than English. Consult the departmental listings for specific language requirements.

7. **Course of Study:** Course requirements are specified in the departmental listings, below. Planning and direction of the student's course of study are the responsibility of the head of the department or a designated departmental advisor. A specific program of study should be worked out at the time of the student's first registration, in consultation with the head of the department or an advisor, which should then be filed with the Office of Graduate Studies. This program of study is subject to later amendment.

Training in methodology may be required, at the discretion of the Department. It is expected that students working toward the degree of Doctor of Philosophy will maintain a superior average in all course work. In no case can credit be given for graduate courses in which the student does not at least have II-class standing. If a student fails to obtain II-class standing in one course he may repeat the course once only, at the discretion of the Dean of Graduate Studies and the head of the department concerned. He may not repeat more than one course.

8. **Committees:** Research undertaken as part of a doctoral program is normally directed and supervised by a doctoral committee. When the student is deemed ready to undertake such research, the Head of the Department will appoint his doctoral committee, which must be approved by the Faculty Council of Graduate Studies.

The composition of the doctoral committee is specified in the Departmental listings. Each committee may include at least one member from outside the Department; such member or members need not participate in the direction of research but will be invited to contribute a judgment on its completion.

The doctoral committee is also charged with conduct of the final examination of the doctoral candidate (see below): the candidate's advisor will act as Chairman of this examination, and examiners external to the University may be added to the committee.

9. **The Dissertation:** A dissertation embodying the results of an original investigation in the field of specialization is required of all candidates for the degree of Doctor of Philosophy. Before beginning his dissertation, the candidate should submit a prospectus, outlining the problem proposed. Copies of this prospectus should be filed with the doctoral committee and in the Office of Graduate Studies, not later than four weeks after the student is admitted to candidacy.

The dissertation may be submitted to an external reader or readers, who may also become part of the doctoral committee for the final examination (see below).

The general format for the dissertation is that prescribed in *The College Research Paper*, by Eugene F. Crewe and John F. Sullivan, 4th ed. (Dubuque, Iowa, 1957), which is available in the Bookstore. Within the dissertation, the student should use forms approved for scholarly publication in the field of specialization and approved by the Department. Final checking of the general format of the dissertation is the responsibility of the Office of Graduate Studies, but the student should consult his committee for instructions as to the internal form of the dissertation.

Four copies of the completed dissertation must be submitted at least six weeks prior to the Convocation at which the candidate expects to receive his degree. The candidate must also submit at this time four copies of an abstract, no more than 500 words in length, and four copies of a *vita*, which will be bound with the thesis, and an additional copy of the abstract for national bibliographical purposes. Arrangements for binding the dissertation should be made with the University Librarian.

If approved, the dissertation becomes the property of the University. Two copies are filed in the University Library and two in the Department.

After the granting of the degree, and at such time as the Department gives approval, the University will have the dissertation microfilmed. One microfilm copy will be deposited in the University Library and will be available for interlibrary loan. The availability of the dissertation in film form will be announced by the published abstract sent to various libraries.

10. **Examinations:** In addition to the usual examinations on course work, there are three types of special examinations which may be required (see Departmental Regulations) in the program leading to the degree of Doctor of Philosophy.

a. Qualifying Examinations: A qualifying examination is one in which the student is asked to demonstrate a reasonable mastery of the fundamentals in his major subject; it is designed to test the student's preparation for advanced graduate work. If such an examination is required, it must be administered and passed within one year after a student enters a graduate program.

b. Comprehensive Examinations: The comprehensive examination is one in which the student is asked to demonstrate a reasonable mastery of the field of his specialization; it is designed to test the student's command of knowledge and his ability to integrate that knowledge, after completion of all or most of his graduate course work. Normally, this examination is written at the end of the second year of graduate study and is a pre-requisite to admission to candidacy.

c. Final Examinations: Traditionally, the final examination of a doctoral candidate is an oral defense of his dissertation. A Department may, however, permit as a substitute for this oral examination the delivery of a public lecture by the candidate or an open seminar to be conducted by the candidate for members of the Faculty and graduate students, on the subject of his research. If external examiners have been added to the doctoral committee, they should be invited to this examination, whatever form it may take.

THE MASTER'S DEGREE

1. **Admission Requirements:** Graduates of the University of Windsor or of other recognized colleges or universities may be admitted to programs leading to the Master's degree. A student with an Honours Baccalaureate or its equivalent, with at least II-class standing in the final year and in the major subject, may be admitted to a one-year Master's program. A student with a Bachelor's degree, with at least B standing in the final year and in the major subject, may be admitted to a two-year Master's program.

Possession of the minimum requirements does not automatically ensure acceptance.

2. **Candidacy:** A student in a one-year Master's program is also a candidate for the Master's degree. Students in the two-year Master's program are not admitted to candidacy until they have completed the first year.

3. **Residence:** Residence requirements are intended to provide for each student an adequate contact with the University, with the faculty in his field of specialization, and with the library, laboratories, and other facilities for graduate study and research. It is expected, therefore, that every student in a program leading to the Master's degree will undertake a full program of study for a minimum of one academic year or its equivalent. Application and interpretation of the residence requirement is the responsibility of the Dean of Graduate Studies, and if a student does not expect to fulfill it in the normal way, he should submit to the Dean, in writing, his reasons for departing from the norm and secure approval for his plan, before beginning his graduate program. See also the section on "Duration of Study" below.

This requirement is not intended to apply to students in the graduate programs which are available by Extension.

4. **Duration of Study:** The normal minimum duration of study for the Master's degree is one full year beyond the Honours Baccalaureate, or its equivalent. Credit for graduate study previously undertaken may be given, but the duration of study at this University may not be reduced beyond the minimum of one year.

5. **Time Limit:** Work on a Master's degree should ordinarily be completed within three consecutive years after the student's first enrollment, except for those Master's programs available by Extension, for which the time limit is eight years. If a student seeks an extension of these time limits he should address a petition to the Dean of Graduate Studies, giving his reasons for the request and plans for the completion of his work. A student who exceeds the time limit may be required to take additional qualifying examinations or additional course work, or both.

6. **Language Requirements:** Some programs require reading knowledge of a language or languages other than English. Consult the departmental listings, below, for specific language requirements.

7. **Course of Study:** Course requirements are specified in the departmental listings, below. Planning and direction of the student's course of study are the responsibility of the head of the department or a designated departmental advisor. A specific program of study should be worked out at the time of the student's first registration, in consultation with the head of the department or an advisor, which should then be filed with the Office of Graduate Studies. This program of study is subject to later amendment.

Training in methodology may be required, at the discretion of the Department. It is expected that students working toward the Master's degree will maintain a II-class average in all course work. In no case can credit be given for graduate courses in which the student does not have at least II-class standing. A candidate for the Master's degree who does not obtain II-class standing in any course may repeat the course once only, and he may not repeat more than one course.

8. **Committees:** Research undertaken as part of a Master's program is normally directed and supervised by a Master's committee, appointed by the Head of the Department not later than one month after registration in the student's final year, and subject to approval by the Faculty Council of Graduate Studies. The Master's Committee will consist of a chief advisor, as chairman, and two others, one of whom should, if feasible, belong to a department other than the one in which the student is majoring. If a member from another department is included, he need not participate in the direction of research but will be invited to contribute a judgment on its completion.

The Master's committee is also charged with conduct of the final examination of the Master's candidate (see below).

9. **Thesis or Major Paper:** A thesis, incorporating the results of an investigation in the field of the major subject, is required of candidates for the M.Sc. degree in Biology, in Chemistry, and in Experimental Physics, and of candidates for the M.A. degree who have chosen the first course of studies mentioned below.

Candidates for the Master of Arts degree may choose, instead of the course of study including a thesis, a program requiring additional course work and the submission of a major paper on which there will be a final examination. Candidates for the M.A.Sc. degree may, at the discretion of the Department involved, either submit a thesis or take a program including additional course work and submission of a major paper and/or a comprehensive examination. Candidates for the M.B.A. degree are required to prepare a major paper.

General format for the thesis is that prescribed in *The College Research* Paper, by Eugene F. Crewe and John F. Sullivan, 4th ed. (Dubuque, Iowa, 1957), which is available in the Bookstore. Within the thesis, the student should use forms approved for scholarly publication in the field of specialization. Final checking of the general format of the thesis is the responsibility of the Office of Graduate Studies, but the student should consult his committee for instructions as to the internal form of the thesis.

Three copies of the completed thesis (four for M.Sc. candidates) must be submitted at least four weeks prior to the Convocation at which the candidate expects to receive his degree. The candidate must also submit at this time three (or four) copies of an abstract of not more than 300 words and three (or four) copies of a vita, which will be bound with the thesis. Arrangements for binding the thesis should be made with the University Librarian.

If approved, the thesis becomes the property of the University. Two copies, the original and one other, will be filed in the University Library and one copy (or two copies) in the Department.

These regulations regarding the thesis apply, *mutatis mutandis*, to the major paper, if the candidate has elected that course program.

10. **Examinations:** In addition to the usual examinations on course work, there are three types of special examinations in the program leading to the Master's degree:

a. Qualifying Examinations: A qualifying examination is one in which the student is asked to demonstrate a reasonable mastery of the fundamentals in his major subject; it is designed to test the student's preparation for advanced graduate work. If such an examination is required, it must be administered and passed before the student registers for his final year of Master's work.

b. Comprehensive Examinations: The comprehensive examination is one in which the student is asked to demonstrate a reasonable mastery of the field of his specialization; it is designed to test the student's command of knowledge and his ability to integrate that knowledge, after completion of

all or most of his graduate course work. Normally, this examination is written at the end of the student's final year of study for the Master's degree.

c. Final Examinations: Traditionally, the final examination of a candidate for a Master's degree is an oral defense of his thesis or major paper. A Department may, however, permit as a substitute for this oral examination an open seminar to be conducted by the candidate for graduate students and faculty in his Department, on the subject of his research.

APPLIED SCIENCE

Particular Requirements:

I. THE DOCTOR OF PHILOSOPHY DEGREE IN APPLIED SCIENCE

(Departments of Chemical, Civil, Electrical, Mechanical Engineering, and Engineering Materials.)
In addition to the general requirements and stipulations listed on page 26 ff. for a Doctor's Degree, the following Particular Regulations must be met by all graduate students:

1. Admission Requirements:

An applicant for admission to a course of graduate studies leading to the Doctorate in Applied Science must be a graduate of a recognized College or University with at least a Bachelor's Degree in Applied Science, Engineering or Pure Science. An applicant's Bachelor's Degree need not be in his chosen field of graduate studies but should be in a related field.

2. Course Work:

A student must complete successfully a minimum of six full graduate courses beyond the Bachelor's Degree, as outlined by the Department of his chosen field of study. He must also participate in the seminars, colloquia, etc., as the Department may require.
A student should maintain an overall average of 70% in his graduate courses. The student's Doctoral Committee will make recommendations to the Dean of Graduate Studies if his performance in the Graduate Studies is not satisfactory.

3. Doctoral Committee:

Each student will be assigned to a Doctoral Committee during his first year of study. The student's advisor will be the Chairman of this Committee. The Committee will consist of at least two additional members of the Department of Engineering concerned and one member from outside the Department. Further members from within or without the University may be added if this is desirable. The Advisor will advise the student in his choice of courses and guide his research. The Committee will review his progress from time to time, examine his dissertation and take part in his final oral examination.

4. Language Requirements:

Every student must have reading knowledge of at least one modern language other than English. Ordinarily, this language will be chosen from among French, German, and Russian. However, a student may substitute another language if, in the opinion of his Doctoral Committee, a knowledge of the substituted language would be valuable in the conduct of his research.

5. The Dissertation:

A dissertation embodying the results of an original investigation in the selected branch of specialization is required of candidates for the Ph.D. degree.

The prospectus of the dissertation must be approved by the student's Doctoral Committee and submitted to the Dean of Graduate Studies within four weeks of the student's becoming a candidate for the Ph.D. degree. Minor modifications of the prospectus may be made at a later date.

The format of the dissertation must agree with the general requirements for the dissertation in the Faculty of Graduate Studies and must be submitted to the candidate's Doctoral Committee at least six weeks or sooner if the Committee so directs, before the expected date of graduation.

The Dean of Graduate Studies, in consultation with the Doctoral Committee, may appoint one person, expert in the field but outside this University, who will review the dissertation and make recommendations. The Dean of Graduate Studies will advise the candidate's Doctoral Committee about these recommendations; the Committee will then consider them along with their own findings about the candidate's dissertation. The Dean of Graduate Studies may waive this requirement if arrangements have been made to ensure the publication of the dissertation in a recognized technical journal, either as a whole or in modified form approved by the Doctoral Committee.

6. Examinations:

In addition to the language examinations and course work, all students must meet the following requirements:

(a) At the beginning of each academic year, every student will have to satisfy his Doctoral Committee that he is qualified to proceed with his studies. To this end, the Doctoral Committee may require a written and/or oral examination.

(b) The passing of a comprehensive examination, written and/or oral, at the discretion of the Doctoral Committee, to ensure that the candidate has a thorough knowledge of his field of specialization.

(c) The passing of the final oral examination in defence of his dissertation. This examination will be conducted by a committee composed as stipulated in the general regulations for the Doctoral Programme. This Examining Committee may have available the opinion of an external examiner, if one is appointed.

II. THE MASTER OF APPLIED SCIENCE DEGREE

For General Regulations, see p. 29.

Particular Regulations:

1. **Admission Requirements:**

A candidate for the degree of Master of Applied Science shall hold the degree of Bachelor of Applied Science of this University or an equivalent degree in Applied Science or Engineering. (In addition, he must have an average of II standing or its equivalent in his major subjects).

An applicant having a Bachelor's degree in Science or Applied Mathematics may be admitted as a candidate on the recommendation of the Department concerned and subject to the approval of the Faculty of Graduate Studies.

Candidates are urged to apply as early as possible to enable the Committee to evaluate qualifications and work out a program.

2. **Period of Study:**

The duration of the course will be adjusted individually for each candidate. A minimum of one year in residence, or equivalent, will be required. If more than six hours a week are spent in teaching or other departmental duties, additional time will be required. No candidate may be registered for the M.A.Sc. degree for more than eight years.

3. **Course of Study:**

Candidates will be required to complete a minimum of six courses of which one to three may be replaced by a thesis. The thesis may be replaced by an equivalent amount of course work at the discretion of the Department involved, in which case a major paper and/or a comprehensive examination will be required. A "course" shall constitute not less than 50 hours of lectures or the equivalent.

4. **Language Requirements:**

It is not obligatory to take a foreign language for credit but a candidate may be asked to demonstrate a reading knowledge of a foreign language at the discretion of the Department concerned.

5. **Particular Examination Requirements:**

A candidate who does not obtain 66% in any course may repeat the course once only, and he may not repeat more than one course.

BIOLOGY

Professor: W. G. Benedict, Ph.D.

Associate Professors: R. J. Doyle, Ph.D., Head of Department.
C. C. Kuehner, Ph.D.
H. D. McCurdy, Ph.D.
M. L. Petras, Ph.D.

Assistant Professors: J. R. Dougherty, C.S.B., M.S.
D. T. N. Pillay, Ph.D.
L. R. Sabina, Ph.D.
A. H. Warner, Ph.D.
J. E. J. Habowsky, Ph.D.

I. THE DOCTOR OF PHILOSOPHY DEGREE

In addition to the general requirements listed on page 26 ff., the following requirements must be met by all students proceeding to the Ph.D. degree.

1. Admission Requirements:

A candidate for the degree of Doctor of Philosophy in Biology must be a graduate of a recognized College or University with an Honours degree in Biology or equivalent, or a degree in a related field acceptable to the department.

2. Course Work:

Candidates for the Ph.D. degree must successfully complete five full courses beyond the Honours bachelor level. These courses will include three in the major field and two in the minor field. A candidate must maintain a "B" in all courses in Biology and a "B" average in the minor area. Any student whose performance is deemed unsatisfactory on course work or research will be asked to withdraw. A student is required to attend and, as requested, deliver, departmental seminars each year of graduate study.

3. Doctoral Committee:

Within one month after a candidate's registration, the Head of the Department will, in consultation with the Dean of Graduate Studies, assign a temporary advisor to assist the student in his program. Not later than the time of departmental approval as a candidate, the student will be assigned an advisory committee which will consist of at least four members, one of whom must be from outside the department. The research advisor will act as chairman of this committee. The committee will review the student's progress from time to time, examine his dissertation and take part in his final oral examination.

4. Dissertation:

A dissertation embodying the results of an original investigation in the field of the major subject is required of all candidates. It is expected that this will be of a quality suitable for publication in an acceptable biological journal.

5. Language Requirements:

The student will be expected to demonstrate by written examination a reading knowledge of two languages other than English. The choice of these languages will be made by the advisory committee in conformity with the student's research interests.

6. Examinations:

The Graduate Record Examination will be required of every student pursuing Graduate Studies. For general requirements governing examinations see page 25. In addition, written qualifying examinations will normally be required of all students. Comprehensive examinations will be held in both major and minor fields.

II. THE MASTER OF SCIENCE DEGREE

Particular Requirements:

(i) In addition to the general requirements listed on page 29 ff. for the Master's degree, the candidate shall (1) successfully complete three full courses, one of which may be selected from a cognate field, (2) conduct a seminar each year of his registration, and (3) complete original research work and embody it in a thesis.

(ii) The candidate for the Master's degree shall successfully pass an examination to test reading knowledge in a language other than English. The language will be selected in consultation with the Department Head and the examination will be given in conjunction with the Language Department.

(iii) The Graduate Record Examination will be required of every student pursuing Graduate Studies.

III. DETAILS OF SUBJECTS

Not all of the courses listed will necessarily be offered in any one year.

I. BOTANY

540a. Plant Physiology: Cellular functions, water relations and inorganic nutrition. *(2 lectures, 3 laboratory hours a week (half course).)*

540b. Plant Physiology: Plant metabolism, growth and development. *(2 lectures, 3 laboratory hours a week (half course).)*

541a. Plant Pathology: The symptomatology, epidemiology and histology of plant diseases. *(2 lectures, 3 laboratory hours a week (half course).)*

541b. Plant Pathology: The biological and biochemical aspects of plant disease control. *(2 lectures, 3 laboratory hours a week (half course).)*

542a. Physiology of Plant Parasitism: The parasitic activity of facultative plant parasites. *(2 lectures, 3 laboratory hours a week (half course).)*

542b. Physiology of Plant Parasitism: The influence of environment on plant disease expression. *(2 lectures, 3 laboratory hours a week (half course).)*

543c. Plant Viruses and Virus Diseases: The sympotomatology, transmissability and physiology of infection of plant viruses. *(2 lectures, 3 laboratory hours a week (half course).)*

544b. Plant Growth Substances: Nature and physiological effects of auxins, gibberellins, kinins, inhibitors and growth retardants. *(2 lecture hours per week (half course).)*

550y. Seminar: Presentation and discussion of brief reviews of current botanical literature. *(1 hour a week (half course).)* May be repeated once only for credit.

555. Special Topics in Botany: Selected topics of current interest. (Prerequisite: consent of instructor. *(2 hours a week.)*

II. MICROBIOLOGY

529a. Microbial Genetics: The genetics of bacteria, fungi, and viruses. *(3 lectures a week (half course).)*

531a. Virology and Cell Culture: An advanced course to acquaint students with the fundamental principles of virology and special cell culture techniques. *(1 lecture, 6 laboratory hours a week (half course).)*

540b. Microbial Physiology: Cytochemistry, nutrition, metabolism and population kinetics of microorganisms. *(2 lectures, 4 laboratory hours a week (half course).)*

550y. Seminar: Presentation and discussion of brief reviews of current literature in microbiology. *(1 hour a week (half course).)* May be repeated once only for credit.

555. Special Topics in Microbiology: Selected topics of current interest in microbiology. (Prerequisite: consent of instructor). *(2 hours a week.)*

III. ZOOLOGY

529a. Mammalian Genetics: The genetic control of morphological and biochemical variants, qualitative traits and certain developmental phenomena in mammals. *(3 lecture hours a week (half course).)*

529b. Population Genetics: The genetics of populations composed of bisexual organisms. *(3 lecture hours a week (half course).)*

544b. Developmental Biology: A study of nucleocytoplasmic interactions and the role of the nucleic acids during embryonic development. (Prerequisite: Zoology 34a, Chemistry 36, and/or consent of instructor). *(3 lectures a week; one semester (half course).)*

548b. Microtechniques: A laboratory course introducing a variety of research techniques: embedding and sectioning, staining, cyto- and histochemical methods, photomicrography, electron microscopy, and similar techniques. (Prerequisites: Biology 228a, and consent of instructor). *(2 lectures, 4 laboratory hours a week, one semester (half course).)*

550y. Seminar: Presentation and discussion of brief reviews of current literature in the field of zoology. *(1 hour a week (half course).)* May be repeated once only for credit.

555. Special Topics in Zoology: Selected topics of current interest. (Prerequisite: consent of instructor). *(2 hours a week.)*

BUSINESS ADMINISTRATION

Professors: G. R. Horne, B.A., M.A., Ph.D., Dean.

Michael Zin, B.Comm., M.B.A., Ph.D.
C. M. Birch, B.A., M.A., Ph.D.

Associate Professors: J. B. Gertz, B.S., M.B.A.
J. M. Brownlie, B.A., M.B.A.
E. M. Basic, B.S.E.E., B.S.M.E., M.B.D., Ph.D.

Assistant Professors: P. B. Buchan, B.A.Sc., M.Comm.
M. D. Beckman, Th.B., B.Sc., M.B.A.

I. THE MASTER OF BUSINESS ADMINISTRATION DEGREE

The purpose of the Master of Business Administration program is to provide broad post-graduate studies in the general field of business administration. The graduate student is afforded the opportunity to expand his knowledge of the principal phases of business administration, and thereby be prepared for responsible performance in private business and public service careers.

The general principles of management are emphasized throughout the program; this approach is supplemented by the use of the case method of instruction to bring reality to the studies.

Particular Admission Requirements:

1. Graduates with the Bachelor of Commerce Honours (4 years from Grade XIII) from this or other universities, with second class standing, who have done satisfactory work in all the subjects included in the first year of the Master's program as indicated below, are eligible to complete the degree in one year.

2. Graduates who have done work elsewhere comparable to that included in the first year of the Master's program here will be eligible to enter the second year.

3. Applicants possessing the Bachelor of Commerce General Degree or equivalent, will be required to take courses as approved by the Dean of the Faculty of Business Administration.

4. Students are admitted to the second year if they have secured an average of second class standing in the required subjects of the first year. A second class average is required in the second year to receive the M.B.A. degree. All marks will be counted in computing the average for any year, but no credit will be given for any course with a mark of less than 60.

5. Applicants are required to take the Admissions Test for Graduate Study in Business.

Evening Students. Provision is made for candidates in full-time employment to spread the work for the degree over a number of years. There is no time limit for the work of the first year but the work of the second year must be covered in not more than four consecutive years. Only two subjects may be taken concurrently by part-time students.

First Year

Bus. Ad. 501ab Statistical Methods in Business.
Bus. Ad. 503ab Marketing.
Bus. Ad. 505ab Organizational Behavior, Industrial Relations.
Bus. Ad. 509 Accounting.
Bus. Ad. 513 Corporation Finance.
Bus. Ad. 517b Production Management.
Bus. Ad. 523a Computers and Systems Analysis.

Second Year

Bus. Ad. 550ab Business Policy.
Bus. Ad. 554ab Administrative Accounting.

Three full courses chosen from the following:

Bus. Ad. 552ab Administrative Problems.
Bus. Ad. 556c Contemporary Business Problems.
Bus. Ad. 557c Production.
Bus. Ad. 558ab Marketing Management and Strategy.
Bus. Ad. 559c Marketing Research and Analysis.
Bus. Ad. 560c International Marketing and Finance.
Bus. Ad. 561ab Investment Analysis and Management.
Bus. Ad. 563c Human Relations in the Industrial Community.
Bus. Ad. 564ab Public Administration.
Bus. Ad. 566ab Statistical Analysis.
Bus. Ad. 568c Accounting Theory—Assets.
Bus. Ad. 569c Accounting Theory—Equities.
Bus. Ad. 570c Financial Management.
Bus. Ad. 571c Capital Budgeting.

One subject (for which the student must have the undergraduate qualifications) from other graduate courses, if approved by the Dean of the Faculty of Business Administration and the Department concerned.

In addition to the subjects listed, the student is required to prepare a paper on some research subject.

The prerequisite for a second term course is its corresponding first term course. The letter "c" has no prerequisite second year course.

Diploma in Management

Upon completion of the first year M.B.A. program with an average of "B" or better, a student who is **not able to continue** in the M.B.A. program may apply for a Diploma in Management.

Details of Subjects

501a. Statistical Methods in Business I: Description of sample data, probability, theoretical distributions, sampling, estimation, hypothesis testing, correlation, regression, time series and index numbers. *(2 hours a week, one semester.)*

501b. Statistical Methods in Business II: The application of statistics to a wide variety of problems in business. *(2 hours a week, one semester.)*

503a. Marketing Principles and Policies I: Marketing policy formation and application to problems of consumers, merchandising and channels of distribution. *(3 hours a week, one semester.)*

503b. Marketing Principles and Policies II: The management of personal selling and sales promotion, pricing, marketing research and integrated marketing programs. *(3 hours a week, one semester.)*

505a. A study of: Individual and group behavior in business organizations. The course is designed to help those intending to assume positions of leadership in commerce and industry by enabling them to improve their competency in understanding and dealing with the human problem of administration. *(3 hours a week, one semester.)*

505b. Industrial Relations: A case course stressing worker-management relations under unionized conditions. *(2 hours a week, one semester.)*

509. Accounting: Accounting concepts and techniques as tools for the administration of the economic activity of the business enterprise. *(6 hours a week, one semester.)*

513. Corporation Finance: A basic course in business finance. Taught with emphasis on analysis rather than description with the object of demonstrating principles. *(6 hours a week, one semester.)*

517b. Production Management: A study of the production function in modern industry; application of analytical tools (including operations research) emphasized in solving production problems. *(3 hours a week, one semester.)*

523a. Computers and Systems Analysis: A fundamental appraisal of computers and E.D.P. systems for modern management. *(3 hours a week, one semester.)*

550a. Business Policy I: Development of theory and concepts to aid executives responsible for guiding business enterprises in making decisions. *(3 hours a week, one semester.)*

550b. Business Policy II: A continuation of 500a, with more complex applications. *(3 hours a week, one semester.)*

552a. Administrative Problems I: The basic problems facing the senior administrator; management's responsibilities of organizing, planning, leading, measuring and controlling. *(3 hours a week, one semester.)*

552b. Administrative Problems II: The work of the first term is built upon and integrated with consideration of administrative problems of a large number of companies in widely diversified industries. The 1620 Computer is used to simulate competitive situations. *(3 hours a week, one semester.)*

554a. Administrative Accounting I: The role of accounting in communicating financial information to various levels of management as a basis for administrative decisions. *(3 hours a week, one semester.)*

554b. Administrative Accounting II: Development of methods and techniques to control non-manufacturing costs and joint costs; product pricing; intercompany pricing; capital expenditure programs and contemporary accounting problems. *(3 hours a week, one semester.)*

556c. Contemporary Business Problems: A search for countervailing power as an alternative to greater direction by government in solving current problems. *(3 hours a week, one semester.)*

557c. Production: A review of the latest analytical tools of economics and mathematics and their application to solving production problems, thereby bridging the gap between the new insights, theories, and methods of management science, and the needs of the production manager. Some knowledge of mathematics (including an introduction to calculus) is assumed. *(3 hours a week, one semester.)*

558a. Marketing Management: The factors affecting consumer demand and the methods of satisfying it. Stress is placed on the organization and management aspect of the subject. *(3 hours a week, one semester.)*

558b. Marketing Strategy: The significance of products, pricing, promotion, distribution and the consumer in the formulation of both long-term and current plans for market development. *(3 hours a week, one semester.)*

559c. Marketing Research and Analysis: Analysis of methods of investigation that can be used to solve marketing problems. Nature and scope of marketing research; planning of investigations; use of secondary data; sampling; construction of communication forms; control of field activities; tabulation and analysis of results. Techniques of specialized research activities. *(3 hours a week, one semester.)*

560c. International Marketing and Finance: Merchandising in the world market and financing of trade transactions. *(3 hours a week, one semester.)*

561a. Investment Analysis and Management I: Types of corporate securities for investment; theory and mechanics of investment; general analysis and valuation procedures. *(3 hours a week, one semester.)*

561b. Investment Analysis and Management II: Valuation of fixed income securities and common stocks; procedures in analysis of government, industrial, financial and public utility securities; portfolio management. *(3 hours a week, one semester.)*

563c. Human Relations in the Industrial Community: A graduate seminar designed for those who will be concerned with administration of the human resources in the business community. Study is programmed to encourage the student to formulate acceptable theory and sound personnel principles. *(3 hours a week, one semester.)*

564a. Public Administration I.

564b. Public Administration II.

566a. Statistical Analysis I: The application of statistical techniques to business decisions; emphasis on decision problems under uncertainty; use of probabilities, statistical decision rules, and the sampling of measured values. *(3 hours a week, one semester.)*

566b. Statistical Analysis II: A continuation of Bus. Ad. 516a. *(3 hours a week, one semester.)*

568c. Accounting Theory — Assets: A review of current accounting literature relating to an evaluation of accounting concepts and standards. Emphasis is upon their application to assets and income determination. *(3 hours a week, one semester.)*

569c. Accounting Theory — Equities: A review of current accounting literature relating to an evolution of accounting concepts and standards. Emphasis is upon their application to the determination, measurement, classification and reporting of equities. *(3 hours a week, one semester.)*

570c. Financial Management: The working capital problems of business enterprises; function and theory of working capital; sources of working capital; factors determining working capital needs; techniques of forecasting needs; and preparing budgets. *(3 hours a week, one semester.)*

571c. Capital Budgeting: Problems in effective acquisition and utilization of capital resources. Planning the capital structure; financial programs; appraising return on investment; allocation of funds among investment opportunities; dividend policies; valuation and merger; reorganization. *(3 hours a week, one semester.)*

CHEMICAL ENGINEERING

Professor: M. Adelman, Ph.D., Head of Department.

Associate Professor: A. W. Gnyp, Ph.D.

Assistant Professors: R. A. Stager, M.A.Sc., Ph.D.
G. P. Mathur, Ph.D.
C. C. St. Pierre, Ph.D.

For Admission Requirements and period of study, the General Regulations of the Faculty of Graduate Studies should be consulted, (p. 26). The Particular Requirements governing candidates for the Ph.D. in Applied Science are outlined on p. 32, and the Particular Requirements for the M.A.Sc., in Applied Science are outlined on p. 34

Ch.E. 500. Seminar.

Ch.E. 501c. Transport Phenomena I: General transport theory; fundamentals of momentum transfer, Navier-Stokes equation, compressible flow. Fundamentals of heat transfer; conductive and radiative heat transfer. *(3 hours a week, one semester.)*

Ch.E. 502c. Chemical Engineering Thermodynamics: An advanced study of the application of classical thermodynamic principles to chemical engineering practice. Open statistical mechanics. Irreversible phenomena: phenomenological approach, the molecular equilibria, and prediction of thermodynamic properties. *(3 hours a week, one semester.)*

Ch.E. 503c. Process Control and Instrumentation: A study of the important principles of automatic control with particular emphasis on process control, beginning with process analysis and continuing into generalized behavior of closed-loop systems. The theory, selection and application of control elements are also studied, employing practical system problems encountered in Chemical Engineering. *(3 hours a week, one semester.)*

Ch.E. 504c. Chemical Engineering Kinetics: An advanced study of the application of kinetic principles to chemical reactor design, analysis of batch reactor data, design of ideal backmix and plug flow reactors, design considerations for multiple reactions, non ideal mixing. *(3 hours a week, one semester.)*

Ch.E. 505c. Electrochemical Engineering: Origin of the electrical potential difference. Electrolytic conduction, Dabye-Huckel theory, double layer, static electrification, passage of current through electrolytic cell. *(3 hours a week, one semester.)*

Ch.E. 506c. Mathematical Methods in Chemical Engineering I: Application of ordinary differential equations to chemical engineering problems; series solution; Bessel's equation, Lagendre's equation, formulation and solution of partial differential equations, Fourier series. **(3 hours a week, one semester.)**

Ch.E. 507c. Non-Newtonian Fluid Technology: Formulation of stress and strain tensors. Constitutive equation and its derivation. Rheological classification of industrially important non-Newtonian fluids. The viscometry of non-Newtonian fluids, non-Newtonian fluid boundary layer equation, heat transfer, pipe line design, and mixing of non-Newtonian fluids. *(3 hours a week, one semester.)*

Ch.E. 514c. Heterogeneous Reactor Design: Rate phenomena in catalytic and non-catalytic systems, significance of physical transfer equations in catalytic reactor design. *(3 hours a week, one semester.)*

Ch.E. 516c. Mathematical Methods in Chemical Engineering II: Complex algebra; integral transforms, special functions, vector analysis, numerical methods, matrices, applications to chemical engineering problems. *(3 hours a week, one semester.)*

Ch.E. 521c. Optimization Techniques for Chemical Systems: Theory of maxima and minima, comparison of the techniques for optimization, application of optimization methods to chemical engineering systems. *(3 hours a week, one semester.)*

Ch.E. Corrosion: Clean surfaces, surface damage to metals, effect of imperfections on dissolution, electrode solution interfaces, electrolytic etching of metals, electrochemistry of dissolution, dissolution of metals, oxidation of metals. *(2 hours a week, two semesters.)*

Ch.E. 590c. Selected Topics in Chemical Engineering: A study of selected topics of current interest to chemical engineering. *(3 hours a week, one semester.)*

CHEMISTRY

Professors: K. G. Rutherford, B.A., Ph.D., Head of Department.
F. A. DeMarco, B.A.Sc., M.A.Sc., Ph.D.

Associate Professors: W. J. Holland, B.S., M.S., Ph.D.
E. W. Channen, B.Sc., Ph.D.
R. J. Thibert, M.S., Ph.D.
S. J. Price, M.Sc., Ph.D.
Rev. G. W. Kosicki, C.S.B., M.S., Ph.D.

Assistant Professors: G. W. Wood, B.Sc., Ph.D.
D. J. McKenney, B.Sc., M.Sc., Ph.D.
E. J. Bounsall, B.A.Sc., M.A., D.I.C., Ph.D.
R. C. Rumfeldt, B.Sc., Ph.D.

I. THE DOCTOR OF PHILOSOPHY DEGREE

1. Particular Requirements:

In addition to the general requirements listed on page 26 ff., the following requirements must be met by all students proceeding to the Ph.D. degree.

Course Work:

Graduate students proceeding to the Ph.D. degree must successfully complete the following minimum course work:

(a) Three full graduate courses in the major field.

(b) Two full graduate chemistry courses outside the major field.

(c) Two full courses in a cognate field or fields.

(d) Seminar to be taken each year the student is registered.

No student may elect to take more than ten courses, without the consent of the major advisor.

Any student who fails to maintain satisfactory standing in all course and dissertation work may be asked to withdraw.

2. Doctoral Committee:

Within one month after registration, the Head of the Department will, in consultation with the Dean of Graduate Studies, assign the graduate student's doctoral committee. This committee will consist of six members, three of whom are to be chosen from the Chemistry Department and three from outside the department (two of whom should be from a cognate field), being appointed by the Dean of Graduate Studies.

3. Language Requirements:

The student will be expected to demonstrate by written examination a reading knowledge of:

(a) German or Russian;

(b) another language as approved by the Department.

The language examinations will be offered annually in conjunction with the Department of Modern Languages and must be successfully passed before admittance to the Comprehensive Examination.

4. Dissertation:

A dissertation embodying the results of an original investigation in the field of the major subject is required of candidates for the Ph.D. degree. For general requirements, see page 28.

5. Examinations:

In addition to language examinations and course work, all students proceeding to the Ph.D. degree must meet the following additional requirements (in certain cases some of these requirements may be waived):

(a) Qualifying Examination:
A reasonable mastery of the fundamentals of the major fields of chemistry, tested by a written examination to be completed within one year after the student enters a graduate program.

(b) Comprehensive Examination:
A reasonable mastery of the field of specialization chosen, tested by a comprehensive written examination given normally at the end of the second year of graduate study.

(c) Final Examination:
The passing of a final oral examination in defense of the dissertation. An examiner from outside the institution, chosen by the candidate's major advisor, may be present at the defense of the dissertation at the discretion of the Department Head.

For description of the above types of the examination, see page 28.

II. THE MASTER OF SCIENCE DEGREE

Particular Requirements:

In addition to the general requirements and stipulations listed on page 29 ff. for the Master's degree, the following course requirements must be met by all candidates: the successful completion of at least three and not more than five full courses, one of which must be in a cognate field. A seminar must be taken each year the candidate is registered, and original research work must be pursued and embodied in a thesis. All courses will be selected in consultation with the Department Head to suit the candidate's major field of study.

In addition, the Master's candidate must successfully pass an examination to test reading knowledge in a language other than English. The language will be selected in consultation with the Department Head and the examination will be given in conjunction with the Language Department.

III. DETAILS OF SUBJECTS

Not all of the courses listed will necessarily be offered in any one year. Special topics courses can be taken several times provided the course content is different.

I. ANALYTICAL CHEMISTRY

532. Advanced Analytical Chemistry: The analysis of alloys, minerals and ores employing titrimetric, gravimetric and instrumental methods. (Prerequisite: Chemistry 332). *(2 lectures, 3 laboratory hours a week.)*

542a. Instrumental Analysis: Ultraviolet, visible and infrared spectroscopy; polarography, colorimetry, conductometric titrations, coulometric titrations, electroanalytical methods. (Prerequisite: Chemistry 332). *(2 lectures, 3 laboratory hours a week, one semester.)*

552b. Special Topics in Analytical Chemistry: Frontiers in the field of analytical chemistry. (Prerequisite: Chemistry 332). *(2 lectures a week, one semester.)*

562a. Radiochemistry: Properties and safe handling of radioactive substances. Experiments dealing with the identification and use of various radioactive isotopes. (Prerequisite: Consent of Instructor). *(2 lectures, 3 laboratory hours a week, one semester.)*

562b. Radiochemistry: Application of tracer techniques to various phases of chemistry. (Prerequisite: Chemistry 562a or equivalent). *(2 lectures a week, one semester.)*

II. BIOCHEMISTRY

536. General Biochemistry: An introductory course in Biochemistry. **(Prerequisite:** Chemistry 333). *(3 lectures, 3 laboratory hours a week.)*

536x. Same as Chemistry 536 but without laboratory.

546a. Intermediate Biochemistry: A study of enzymes. Literature and/or term paper required. (Prerequisite: Chemistry 536 or equivalent). *(3 lectures a week, one semester.)*

546b. Intermediate Biochemistry: A study of hormones. Literature and/or term paper required. (Prerequisite: Chemistry 536 or equivalent). *(3 lectures a week, one semester.)*

556a. Special Topics in Biochemistry. (Prerequisite: Chemistry 536 or 536x or equivalent). *(3 lectures a week, first semester.)*

556b. Special Topics in Biochemistry. (Prerequisite: Chemistry 536 or 536x or equivalent). *(3 lectures a week, second semester.)*

566a. Biochemical Research Methodology: A study of the current methods used in Biochemistry with emphasis on analytical methods. *(1 lecture, 3 laboratory hours a week, one semester.)*

566b. Biochemical Research Methodology: A study of the current methods used in Biochemistry with emphasis on analytical methods. *(1 lecture, 3 laboratory hours a week, one semester.)*

III. INORGANIC CHEMISTRY

535a. An Introduction to Coordination Chemistry: A general survey of coordination compounds; modern theories of coordination chemistry; isomerism in complex compounds. (Prerequisite: Chemistry 335). *(2 lectures a week, one semester.)*

535b. Chemistry of the Less Familiar Elements: Descriptive chemistry of the less familiar elements and their compounds, with emphasis on coordination chemistry. (Prerequisite: Chemistry 335). *(2 lectures a week, one semester.)*

545. Theoretical Inorganic Chemistry: Theoretical considerations of the periodic relationships and reactivities of the elements and their compounds, particularly in the light of recent structural, thermodynamic and kinetic data relating to aqueous and non-aqueous solutions, dry state reactions and high temperature chemistry. (Prerequisite: Chemistry 335). *(2 lectures a week.)*

555. Selected Topics in Inorganic Chemistry: Topics to be arranged by the instructor based primarily upon new developments in the field as gathered from a study of the current research literature. (Prerequisite: Chemistry 535a and 535b). *(2 lectures a week.)*

IV. ORGANIC CHEMISTRY

533. Physical Organic Chemistry: Applications of thermodynamics and kinetics to organic reaction mechanisms. Mass law, ionic strength and salt effects as well as polar and steric effects are discussed from the physiochemical standpoint. (Prerequisite: Chemistry 333, 444 and 464). *(2 lectures a week.)*

543. Synthetic Organic Chemistry: A detailed study of organic reactions with particular reference to multistage syntheses. Stereospecific synthesis. (Prerequisite: Chemistry 333). *(2 lectures a week.)*

553a. Organic Chemistry of High Polymers: Condensation and addition polymers. Stereospecific polymerization. (Prerequisite: Chemistry 333, 444 and 464). *(2 lectures a week, one semester.)*

553b. Heterocyclic Compounds: The chemistry of heterocyclic organic compounds. (Prerequisite: Chemistry 333). *(2 lectures a week, one semester.)*

563. Natural Products: The organic chemistry of the steroids, terpenes, vitamins and drugs. (Prerequisite: Chemistry 543). *(2 lectures a week.)*

573a. Special Topics in Organic Chemistry: Selected topics of recent interest in the field. (Prerequisite: consent of instructor). *(2 lectures a week, one semester.)*

V. PHYSICAL CHEMISTRY

544. Physical Chemistry of High Polymers: Kinetics of condensation and addition polymerization. Physical and thermodynamic properties. Degradation of high polymers. (Prerequisite: Chemistry 444 and 464). *(2 lectures a week.)*

554. Theoretical Chemistry: Statistical and quantum mechanics. Atomic and molecular spectra. (Prerequisite: Chemistry 444). *(2 lectures a week.)*

564. Gas Kinetics: Theoretical and experimental aspects of gas phase reactions. (Prerequisite: Chemistry 444). *(2 lectures a week.)*

574a. Special Topics in Physical Chemistry: Selected topics of current interest. (Prerequisite: consent of instructor). *(2 lectures a week, one semester.)*

574b. Special Topics in Physical Chemistry: Selected topics of current interest. (Prerequisite: consent of instructor). *(2 lectures a week, one semester.)*

584a. Energy Transfer: Mechanisms of energy transfer in simple molecules. *(2 lectures a week, one semester.)*

584b. Gas Chromatography: Theoretical and experimental aspects of gas phase chromatography. *(2 lectures a week, one semester.)*

VI. MASTER'S THESIS

VII. 550. Seminar

VIII. DOCTORAL DISSERTATION

CIVIL ENGINEERING

Professor: J. B. Kennedy, Ph.D., Acting Head of Department.

Associate Professor: C. MacInnis, Ph.D.

Assistant Professors: J. P. Hartt, M.S.C.E.
D. E. L. Maasland, Ph.D.

For Admission Requirements and period of study, the General Regulations of the Faculty of Graduate Studies should be consulted (p. 23). The Particular Requirements governing candidates for the Ph.D. in Applied Science are outlined on p. 32 ff., and the Particular Requirements for the M.A.Sc., in Applied Science are outlined on p. 34 ff.

DETAILS OF SUBJECT

(Former numbers appear in parentheses).

E.S. 501. Experimental Stress Analysis: Stress determination from strain measurements; structural similitude; strain gauge techniques; optical apparatus and experimental procedures in photoelasticity; application; grid methods; brittle-coating methods; applications; Beggs deformeter; experimental considerations. (Prerequisite: Theory of Elasticity I and II). *(2 hours a week, 3 laboratory hours alternate weeks.)*

CE. 501c. Advanced Structural Analysis I: Analysis of multi-story frames and space frames by force, displacement and iterative methods; treatment of non-prismatic and curved members; non-rigid connections; introduction to the use of digital computation in structural analysis; energy methods. *(3 hours a week, one semester.)*

C.E. 502c. Advanced Structural Analysis II: Deflection theory of suspension systems, flexible arches; analysis of structures with axial load effects, materials beyond elastic limit, thermal stresses; shearwall structures; framing system subject to combined bending and torsion. *(3 hours a week, one semester.)*

C.E. 504a. Analysis and Design of Shell Structures I: Membrane stresses in shells of revolution, cylindrical shells, shells of double curvatures, prismatic shells; deformation shells. *(3 hours a week, one semester.)*

C.E. 504b. Analysis and Design of Shell Structures II: Bending stresses in circular cylindrical shells, shells of revolution; buckling of shells; design of cylindrical roofs, domes, folded-plate and curved shell structures; limitations of elastic analysis; elements of plastic strength analysis. *(3 hours a week, one semester.)*

C.E. 505c. Structural Analysis For Dynamic Loads: Behaviour of structural materials under dynamic loading; response of beams, frames, trusses to dynamic loads; lumped and distributed mass systems; energy methods and numerical procedure; elastic-plastic response. *(3 hours a week, one semester.)*

C.E. 506c. Plastic Analysis and Design of Metallic Structures: Stress-strain relationship; moment-rotation characteristics; plastic analysis of beams and frames; deflections; effect of shear and longitudinal force; optimum design; shakedown; design considerations. *(3 hours a week, one semester.)*

C.E. 507c. Prestressed Concrete: Principles of prestressing; materials; prestressing systems; prestress losses; analysis and design of statically determinate and indeterminate structures; design codes; research background. *(3 hours a week, one semester.)*

C.E. 508. Concrete Technology: Cementing materials — Portland cements, aluminous cement, pozzolanic materials; aggregate materials — geology and petrography of concrete aggregates, exploration for, evaluation of and processing methods of aggregates. Admixtures — especially air-entraining agents. Proportioning of concrete mixes — batching, mixing, conveying. Placing and curing methods. Properties of fresh and hardened concrete. Statistics applied to the control of concrete quality. Special concretes, e.g. light weight concretes, concrete for nuclear shielding. *(2 hours a week.)*

C.E. 510a. Theory of Elasticity I: Analysis of stress; analysis of strain; stress-strain relations and the general equations of elasticity; plane-stress and plane-stress problems, including rotating disks, reinforced disks, and thermal stresses; St. Venant's theory of torsion; torsion of various-shaped bars. *(3 hours a week, one semester.)*

C.E. 510b. Theory of Elasticity II: Energy principles and variational methods; application of complex variable theory to elastic problems; numerical methods in the theory of elasticity. *(3 hours a week, one semester.)*

C.E. 511c. Bending and Buckling Theory of Plates: Bending of long rectangular plates to a cylindrical surface; pure bending of plates; small deflections of laterally loaded circular and rectangular plates with various edge conditions; plates under combined action of lateral forces and axial loads; large deflections; buckling of plates under axial and shear loads; energy method; finite-difference approximation. *(3 hours a week, one semester.)*

C.E. 512c. Theory of Elastic Stability: Differential equation for beam-columns; problems with various boundary conditions; elastic buckling of bars and frames; buckling of bars on elastic foundations; flexible bars; torsional buckling; lateral buckling of beams; buckling of rings; curved bars and arches; energy and numerical methods. *(3 hours a week, one semester.)*

C.E. 520 (C.E. 510). Advanced Water and Waste Water Treatment: Characteristics of water and waste water, both chemical and biological, and their influence on the design of treatment facilities. Selected papers covering the more recent advances in the field. *(2 hours a week.)*

C.E. 525 (C.E. 515). The Engineer In Public Health: Epidemiology of communicable disease, food sanitation, swimming pools and bathing beaches, vectors and their control, collection and disposal of municipal refuse, and the effect of substandard housing on the health of the community. *(2 hours a week.)*

C.E. 530. Traffic Engineering: Basic characteristics of traffic, road users, vehicles, speeds, volumes, etc.; traffic surveys; basic considerations in traffic regulation; control devices and aids; factors in traffic design; traffic engineering functions and organizations. *(2 hours a week.)*

C.E. 531c (C.E. 513). Advanced Highway Design: Special problems on stabilization, bases, subgrades, pavements, drainage, frost action. Emphasis on modern approach to geometric design of rural and urban highways. Course includes complete highway design and occasional laboratory. *(3 hours a week, one semester.)*

C.E. 532c (C.E. 514b). Modern Airport Design: Selection of site, runways, modern rigid pavements, stabilization of subgrades, frost action, drainage; course includes airport design problems and projects. *(3 hours a week, one semester.)*

C.E. 540 (C.E. 512). Advanced Soil Mechanics and Applications: Properties of soils, stresses, consolidation, settlements, bearing capacity, stability of slopes, flownets and seepage, stabilization of soils, special problems on buildings, highway and airport foundations, tunnels, underground conduits. Course includes laboratory testing. *(2 hours a week.)*

C.E. 541c (C.E. 514a). Advanced Problems In Foundations: Combined footings, Mat and Raft foundations, group piling, retaining walls, abutments, vibrations in foundations. *(3 hours a week, one semester.)*

C.E. 550 (C.E. 508). Water Power: Stream flow and water power estimates; storage; problems; analysis, design and selection of water power structures and equipment; types and purposes of dams and weirs; turbine analysis; transmission lines; cost and value of water power; typical problems will be studied. *(2 hours a week.)*

C.E. 551 (C.E. 511). Advanced Hydrology: Analysis and synthesis of the hydrograph. Stream-flow routing. The hydrograph as a function of drainage characteristics; estimation of runoff from Meteorological data. Infiltration theory. Sea water intrusion in coastal Aquifers. Application of hydrologic techniques. *(2 hours a week.)*

C.E. 552a (C.E. 509). Advanced Hydromechanics: Theory and analysis of uniform, gradually varied, rapidly varied and unsteady flow in open channel; computation and design of channel. *(3 hours a week, one semester.)*

C.E. 552b. (C.E. 509). Advanced Hydromechanics: Dimensional analysis; similarity and model testing in hydraulic structures and hydraulic machinery; special model laws and practical applications. *(3 hours a week, one semester.)*

C.E. 553a. Ground Water and Seepage: Theory and analysis of ground water flow problems. Confined and unconfined flow. Seepage below dams. Well problems. Theory of models. *(3 hours a week, one semester.)*

C.E. 560c. Special Topics: Selected advanced topics in the field of Civil Engineering. *(3 hours a week, one semester.)*

ECONOMICS

Professors: *W. G. Phillips, Ph.D., Head of Department.
Z. M. Fallenbuchl, Ph.D.

Associate Professor: A. E. Kovacs, Ph.D.

Assistant Professors: Rev. J. F. Callaghan, C.S.B., M.A.
W. J. Gillen, M.A.
P. O. Shontz, Ph.D.

Lecturers: P. R. Burrell, M.A.
J. C. Strick, Ph.D.

I. THE MASTER OF ARTS DEGREE

At the graduate level, students will be expected to specialize in Economics. With the consent of the Department, however, a student specializing in Economics may be permitted to take one graduate course in Political Science.

Particular requirements:

(a) A thesis on some research subject approved by the Department.

(b) An Oral Examination of Economic Theory (including History of Economic Thought, Microeconomics and Macroeconomics) and two other fields. Each candidate is expected to read for the examination under the direction of his Advisor.

(c) The completion of a minimum of two graduate courses.

(d) The candidate must have a reading knowledge of at least one language other than English.

II. DETAILS OF SUBJECTS

501. Seminar in Economic Theory: First semester, micro theory; second semester, macro theory. Staff in Economics. *(2 hours a week)*

510. International Economics: The theory of international economic policy; the interrelation between internal and external balance; economic growth and the balance of payments; international economic institutions; international aspects of economic development and anti-cyclical policies. (Prerequisite: Economics 301). *(2 hours a week (seminar).)*

520. Labour Economics: Selected topics concerned with the labour market, industrial relations, and wage determination. (Prerequisite: Economics 336). Professor Kovacs. *(2 hours a week (seminar).)*

530. Economic Concentration: An advanced study of the theory and institutional development of monopoly and monopolistic competition and government regulatory policies. (Prerequisite: Economics 221). Professor Philips. *(2 hours a week (seminar).)*

540. Econometrics: Selected topics in Econometrics, including the application of statistical inference to studies of demand curves, production and cost functions, input-output relations, macro-economic models. (Prerequisite: Economics 335 and 430). Professor Gillen. *(2 hours a week (half year lectures, half-year seminar).)*

550. Monetary Policy: A study of selected topics in monetary policy, with emphasis on areas of current discussion. Professor Shontz. *(2 hours a week (seminar).)*

560. Economic History: Selected topics in economic history. Professor Callaghan. *(2 hours a week (seminar).)*

570. Economic Development: The theory of economic growth; a comparative study of industrialization processes in various countries; policies for economic development; the technique of developmental planning. (Prerequisite: Economics 402). Professor Fallenbuchl. *(2 hours a week (seminar).)*

Undergraduate honours courses, which may be assigned at the discretion of the Department Head to form part or all of the requirements for the first year of the two year graduate program, may be found in the General Announcement.

*On leave of absence.

ELECTRICAL ENGINEERING

Professor: P. A. V. Thomas, Ph.D., Head of Department.

Associate Professors: *H. R. Fletcher, M.A.Sc.
H. H. Hwang, Ph.D.
S. N. Kalra, M.S., Ph.D.

Assistant Professor: G. V. Venkatesulu, M.S.E.E.

Lecturer: J. J. M. Huschilt, M.A.Sc.

For Admission Requirements and period of study, the General Regulations of the Faculty of Graduate Studies should be consulted (p. 23 ff.). The Particular Requirements governing candidates for the Ph.D. in Applied Science are outlined on p. 32 ff., and the Particular Requirements for the M.A.Sc., in Applied Science are outlined on p. 34 ff.

DETAILS OF SUBJECT

E.E. 500c. Special Topics: Selected advanced topics especially directed in the fields of research in the department. Consent of the instructor required.

E.E. 510c. Graduate Seminar: All graduate students will attend the seminar.

E.E. 521c. Network Analysis: Network topology and fundamental theorems. Matrix formulation. Representation of network functions. Transform techniques and transient analysis. Two-port networks. Filter theory. Signal-flow graphs. *(3 hours a week, one semester.)*

E.E. 522c. Network Synthesis: Energy functions and the positive-real function criterion. Synthesis of driving point impedance of two- and three-element (R, L, C) networks and applications. Topics in four terminal network synthesis and applications. The approximation techniques. *(3 hours a week, one semester.)*

E.E. 531c. Theory of Electromagnetic Fields: Laplace's and Poisson's equations and conformal mapping. Maxwell's equations, scalar and vector potentials. Circuit concepts from field equations. Electromagnetic waves. Mode theory of cylindrical guides and resonators. Radiation and antennas. *(3 hours a week, one semester.)*

E.E. 532c. Advanced Electromagnetic Field Theory: Electromagnetic potentials. Green's function. Boundary value problems. Field equivalence concepts. Spherical and cylindrical wave functions, vector wave functions. Diffraction. **(Prerequisite: E.E. 531c or** equivalent). *(3 hours a week, one semester.)*

E.E. 541c. Advanced Control Systems: Compensation of linear systems. Principles of statistical design. Sampled data systems. Linear time-varying systems. Nonlinear techniques. *(3 hours a week, one semester.)*

E.E. 551c. Principles of Electronic Computers: Analogue and digital computer components and circuits. *(3 hours a week, one semester.)*

E.E. 552c. Application of Electronic Computers: Application of analogue and digital computers to engineering problems and Programming Languages. *(3 hours a week, one semester.)*

E.E. 561c. Advanced Theory of Machines: General principles of rotating machines. General equations of induced voltage, armature reaction, and torque. Steady-state and transient performance of machinery. Machine network analysis. *(3 hours a week, one semester.)*

E.E. 562c. Advanced Power System Analysis: Fundamental concepts. Torque angle characteristics. Multi-machine problems. Stability limits. Economic dispatch, impulse levels, exciter and voltage regular response, system design. *(3 hours a week, one semseter.)*

*On leave of absence.

E.E. 563c. Power System Transients: Travelling waves, free and forced oscillations, reflections, transition points, multi-conductor systems, multi-velocity waves, attenuation and distortion, lightning surges, switching surges, arcing grounds, protective devices, surges in transformer and machine windings. *(3 hours a week, one semester.)*

E.E. 564c. Tensor Analysis of Electric Circuits and Machines: The application of dyadics, matrices and tensors to the theory of electric circuits and machines. *(3 hours a week, one semester.)*

E.E. 565c. Two Dimensional Fields in Electrical Engineering: Calculation and construction of electric and magnetic fields for conductors, plates, vacuum tubes, machine slots, teeth, etc., analogous problems in fluid flow by analytic methods as well as free hand mapping. *(3 hours a week, one semester.)*

E.E. 571c. Solid-State Physical Electronics: Introduction to quantum and statistical mechanics. Band structure. Conductivity, mobiilty and lifetime of carriers. Magnetic properties of solids. Magnetic resonance. *(3 hours a week, one semester.)*

E.E. 572c. Solid-State Applied Electronics: Semiconductor physics. Transistor construction and characteristics. Transistor applications. Ferrites. Tunnel diodes. *(3 hours a week, one semester.)*

E.E. 573c. Linear Active Circuit Design: Four pole and three pole analysis of active circuits. Matrix methods. Feedback theory applied to the design of amplifiers and oscillators. *(3 hours a week, one semester.)*

E.E. 574c. Nonlinear Active Circuit Design: Selected topics in design of nonlinear oscillators and switching circuits. *(3 hours a week, one semester.)*

E.E. 581c. Communication Principles: Basic information theory and encoding. Application in behavioural sciences, business systems and linguistics. *(3 hours a week, one semester.)*

E.E. 582c. Statistical Theory of Communication: Generalized harmonic analysis. Random variables. Noise. Linear and non-linear devices with signal and noise input. Statistical detection of signals. Optimum linear systems. *(3 hours a week, one semester.)*

E.E. 583c. Introduction to Information Theory: Information and information measure. Encoding. Continuous channel with and without memory. *(3 hours a week, one semester.)*

E.E. 591c. Principles and Techniques of Microwave: Microwave principles. Power generation and measurement. Impedence concepts. Representation of microwave circuits. Resonant-cavity, attenuation. Spectrum analysis, microwave measurements. *(3 hours a week, one semester.)*

E.E. 592c. Microwave Electronics: Transit time effects. Interaction of electromagnetic fields and electron streams. Space-charge wave. Velocity modulation tubes, crossed field tubes. Harmonic generation. Amplification. *(3 hours a week, one semester.)*

E.E. 600c. Special Topics: Selected advanced topics especially directed in the fields of research in the department. Consent of the instructor required.

E.E. 621a,b. Advanced Network Theory: Selected topics in modern network theory. *(2 hours a week.)*

E.E. 641a,b. Modern Control Theory: Selected topics in State-Space methods, Variational Calculus, maximum principle and dynamic programming. *(2 hours a week.)*

E.E. 681a, b. Seminar in Finite Automata: Selected topic in Turing machine, finite-state machines and automata. *(2 hours a week.)*

E.E. 682a,b. Advanced Communication Theory: Selected topics in information theory and statistical communication. *(2 hours a week.)*

ENGINEERING MATERIALS

Professors: R. G. Billinghurst, M.A.Sc., Head of the Department.
J. G. Parr, Ph.D., Dean of the Faculty of Applied Science.

Associate Professor: W. V. Youdelis, Ph.D.

For Admission Requirements and period of study, the General Regulations of the Faculty of Graduate Studies should be consulted (p. 23 ff.). The Particular Requirements governing candidates for the Ph.D. in Applied Science are outlined on p. 32 ff., and the Particular Requirements for the M.A.Sc. in Applied Science are outlined on p. 34 ff.

Course requirements for the Ph.D. and M.A.Sc. degrees in Engineering Materials will be selected from the courses listed below and related courses in other departments by consultation between the student and his research advisor.

DETAILS OF SUBJECTS

E.M. 500. Seminar: Required of all graduate students.

E.M. 501. Advanced Crystallography: Application of X-ray diffraction principles to the study of materials, application of Fourier series, single crystal techniques, studies of preferred orientation, imperfections. *(2 hours a week.)*

E.M. 502. Transformations in Metals: Nucleation theory. Theory of rate processes. Applications to diffusion, diffusionless phase changes, eutectoid decomposition, recrystallization, precipitation. Effects of radiation on metals. *(2 hours a week.)*

E.M. 503. Recent Advances in Physical Metallurgy: Review of current metallurgical literature. Discussions on current research in this field. *(2 hours a week.)*

E.M. 504. Irreversible Thermodynamics of Physical Metallurgical Processes: Onsager's reciprocal relations, principle of microscopic reversibility, fluxes and forces, stationary states of various orders, principle of minimum rate of entropy production, specific problem of dendritic crystallization and segregation in alloys will be analysed utilizing irreversible thermodynamic principles. *(2 hours a week.)*

ENGLISH

Professors: Rev. C. P. Crowley, C.S.B., Ph.D., Head of Department.
G. B. Harrison, Ph.D. (Consultant)
Roderick Huang, Ph.D.

Associate Professors: John F. Sullivan, Ph.D.
E. D. LeMire, Ph.D.
Eugene J. McNamara, Ph.D.
Raymond Smith, Ph.D.

Assistant Professors: Lois K. Smedick, B.A.
Douglas M. Schwegel, Ph.D.
Kathleen O'Donnell, Ph.D.

I. THE MASTER OF ARTS DEGREE

Particular requirements:

Either: (i) At least two and not more than three graduate courses, one of which may be in a cognate field, plus a thesis;

Or: (ii) Three graduate courses, one of which must be a seminar course including a major paper upon which there shall be an oral examination or an open seminar.

Language Requirement: Reading knowledge of either French or German is required. A classical language or another modern language may be substituted, with the approval of the Head of the Department, when it has relevance to the student's field of specialization.

Methodology: Knowledge of the methods and tools of scholarship in English is required. A student who has not had English 499a, Scholarship and Bibliography, or its equivalent, may be required to take this course.

II. DETAILS OF SUBJECTS

Graduate courses in English are studies courses, not surveys. For this reason, the corresponding undergraduate survey course, or its equivalent, is always a prerequisite for any graduate course. Furthermore, the specific topics of individual courses will vary from year to year, depending upon the interests and needs of professors and students. It is thus impossible to list in detail the many topics that may from time to time be offered. The schedule below, therefore, lists only the major periods or forms of literature in which special topics will be offered. These special topics courses can be taken several times providing the course content is different. Before beginning an academic year, the Department of English will furnish information as to specific topics of the courses to be offered in that year.

Course Numbers	General Areas
500.	Tutorials
502.	University Teaching of English
505.	The English Language and Linguistics
510.	Literature of the Old English Period
520.	Literature of the Middle English Period
530.	Literature of the Renaissance
540.	Literature of the Neo-Classical Period
550.	Literature of the Romantic Period
560.	Literature of the Victorian Period
570.	Literature of the Modern Period
580.	Literature of the United States
585.	Literature of Canada
590.	Literary Genres: Drama, Criticism, Fiction.

HISTORY

Professor: Rev. D. J. Mulvihill, C.S.B., Ph.D., Department Head.

Associate Professors: Rev. F. J. Boland, C.S.B., Ph.D.
Rev. J. P. O'Meara, C.S.B., Ph.D.
M. N. Vuckovic, Ph.D.
J. K. A. Farrell, Ph.D.
F. A. Walker, Ph.D.

Assistant Professors: K. G. Pryke, Ph.D.
A. I. Mouratides, Ph.D.

THE MASTER OF ARTS DEGREE

Particular Requirements:

I. *Either:* (i) At least two and not more than three graduate courses, one of which may be in a cognate field, plus a thesis;

Or: (ii) Three graduate courses, one of which must be a seminar course including a major paper upon which there shall be an oral examination.

II. All candidates for M.A. degree are required to take History 510, and to write the prescribed examinations.
History 510 is conducted in five parts, as follows:

(i) Historical Method and the Philosophy of History.
(ii) Historiography of Ancient and Medieval Europe.
(iii) Historiography of Western Europe from the 16th to the 19th century.
(iv) Historiography of North America.
(v) Slavonic Historiography.

Candidates will take Parts (i) and (ii) together with such other two parts as may be determined in consultation with the Department.

Language Requirement:

The candidate must have a reading knowledge of at least one language other than English. The language shall be chosen in consultation with the Head of the Department. Written language examinations are set twice a year in conjunction with the Department of Modern Languages of the University.

III. DETAILS OF SUBJECTS

510. Historical Method, Historiography and Bibliography.

520. History of Canada, 1867-1945.

525. Canadian-American Relations 1785 to present.

530. British Political and Social Thought from 1832-1914. A seminar and selected reading course.

535. Modern British Commonwealth of Nations. A seminar and selected reading course, with particular emphasis on the relations among the member countries.

540. American Political and Social Thought from 1820 to 1930. A seminar and selected reading course.

550. Intellectual History of Russia. The Byzantine tradition; development and influences of Russian thought from 1801 to 1956. A seminar and selected reading course.

555. International Relations and World Problems in the 20th Century. A seminar and selected reading course.

560. Political and Social Development in Western Europe, 1789-1914. A seminar and selected reading course.

In special cases, seminars in other areas may be required and will be given by the members of the Department.

Undergraduate honours courses, which may be assigned at the discretion of the Department Head to form part or all of the requirements of the first year of the two year graduate program, may be found in the General Announcement.

MATHEMATICS

Professors: Rev. D. T. Faught, C.S.B., M.A., Head of Department.
H. A. Eliopoulos, M.Sc., Ph.D.
E. Zakon, Dr. Jur.
F. Rothberger, Ph.D.

Associate Professors: A. C. Smith, M.Sc., Ph.D.
D. S. Tracy, M.C., Sc.D.

Assistant Professors: H. R. Atkinson, M.Sc., Ph.D.
S. P. Singh, M.Sc., Ph.D.
K. A. Zischka, M.Sc., Ph.D.

I. THE DEGREE OF DOCTOR OF PHILOSOPHY

For admission requirements, and period of study, the General Regulations of the Faculty of Graduate Studies should be consulted.

1. Course Work:

Candidates must complete successfully at least six graduate courses of which up to four may be transfer credits; further graduate courses are left to the discretion of the adviser and the Department Head.

2. Doctoral Committee:

Each student will be assigned to an advisory committee during his first year of study. The student's adviser will be the chairman of this committee. There will be at least two additional members of the Department of Mathematics on the committee. Further members from within or without the University may be added if this is desirable. The adviser will advise the candidate in his choice of courses. The committee will review his progress from time to time, examine his dissertation, and take part in his final oral examination.

3. Dissertation:

The principal requirement for the Ph.D. degree is the presentation of a dissertation which embodies the results of an original investigation in some branch of mathematics. The results so presented should constitute a significant and original contribution to knowledge which merits reporting in some scholarly publication.

The subject of the dissertation must be approved by the student's Doctoral committee at least one year before graduation. Minor modifications of the subject may be made at a later date.

4. Examinations:

In addition to foreign language examinations and examinations in courses the student must pass a comprehensive qualifying examination and a final oral examination. The comprehensive examination will be set by the Department of Mathematics and will test the student's mastery of several important branches of mathematics.

The examination will be written and may be supplemented by an oral examination. The examination will normally be taken one year after the commencement of graduate studies and will admit the student to the candidacy for the doctoral degree. The examination must be passed at least one year before graduation.

Each candidate will, when recommended by his advisory committee, present himself for a final oral examination in defence of his dissertation. This examination will be conducted by a committee which, in addition to the members of the candidate's advisory committee and an external examiner, may include faculty members from other departments. The chairman and extra departmental members are appointed by the Dean of Graduate Studies in consultation with the Head of the Department.

5. Language Requirements:

A candidate will be expected to demonstrate by written examination a reading knowledge of two of French, German or Russian.

II. THE DEGREE OF MASTER OF SCIENCE

The course of study shall be either at least four graduate courses, or at least three graduate courses, and a major paper upon which there shall be an oral examination.

Language Requirements:

A candidate will be expected to demonstrate by written examination a reading knowledge of one of French, German or Russian.

III. DETAILS OF SUBJECTS

1. PURE MATHEMATICS

501—Advanced Modern Algebra.
502—Topics in Topology.
503—Fundamental Concepts of Algebra.
504—Mathematical Logic.
505—Advanced Geometry.
506—Topics in Differential Geometry and Differential Topology.
507—Functions of a Real Variable.
508—Theory of Integration.
509—Integral Transforms.
510—Partial Differential Equations.
511—Fourier Analysis.
512—Functional Analysis.
513—Ordinary Differential Equations.
514—General Topology.
515—Algebraic Topology.
516—Topics in Algebra.
517—Topics in Analysis.
518—Topics in Complex Analysis.

2. APPLIED MATHEMATICS

550—Advanced Quantum Mechanics and Quantum Field Theory
551—Group Theory and Quantum Mechanics.
552—Topics in Relativity and Field Theory.
556—Advanced Electromagnetic Theory.
557—Hydro- and Aerodynamics.
558—Mathematical Theory of Elasticity.
559—Equations of Mathematical Physics.
560—Functional Analysis with Applications to Theoretical Physics.
561—Numerical Analysis.
562—Selected Topics in Applied Mathematics for Engineers.

MECHANICAL ENGINEERING

Professor: W. G. Colborne, M.Sc., Head of Department.

Associate Professors: A. A. Nichol, Ph.D.
H. J. Tucker, M.Eng.

Assistant Professors: K. Sridhar, Ph.D.
W. P. T. North, Ph.D.

For Admission Requirements and period of study, the General Regulations of the Faculty of Graduate Studies should be consulted (p. 23 ff.). The Particular Requirements governing candidates for the Ph.D. in Applied Science are outlined on p. 32 ff., and the Particular Requirements for the M.A.Sc., in Applied Science are outlined on p. 34 ff.

DETAILS OF SUBJECT

With the permission of the chief advisor and the Department Head, certain M.E. 400 courses related to the graduate field of study may be taken for graduate credit, provided that a minimum of two courses at the 500 level be taken.

M.E. 501c. Compressible Flow: Equations of motion, various types of flow, waves and shocks, reflection of waves, critical Mach number, heating or cooling with friction. *(3 hours a week, one semester.)*

M.E. 502c. Theory of Viscous Fluids: Laminar flow. Navier-Stokes equations with exact and approximate solutions, approximate solution of the boundary layer by momentum theorem. *(3 hours a week, one semester.)*

M.E. 503c. Theory of Viscous Fluids: Turbulent flow. General theories, wall turbulence, free turbulence. *(3 hours a week, one semester.)*

M.E. 504c. Heat Transfer: Conduction, heat conduction equations, analytical solutions of the conduction equations, numerical and graphical solutions. *(3 hours a week, one semester.)*

M.E. 505c. Heat Transfer: Convection, the energy equation, laminar heat transfer, turbulent heat transfer and analogies between heat and momentum transfer, forced and free convection, boiling heat transfer. *(3 hours a week, one semseter.)*

M.E. 506c. Heat Transfer: Radiation, radiation through non-absorbing medium, gas and flame radiation, solar radiation collectors, radiation from fins and tubes. *(3 hours a week, one semester.)*

M.E. 507c. Experimental Techniques in Flow Measurements: A course covering the theory of flow and velocity measurement. Emphasis will be placed on hot wire instruments and turbulence measurements. *(3 hours a week, one semester.)*

M.E. 508c. Data Reduction: A course covering the application of statistics to the treatment of experimental data. *(3 hours a week, one semester.)*

M.E. 509. Mechanical Vibrations: Harmonic vibrations in systems with one degree of freedom, non-harmonic vibrations in systems with one degree of freedom, systems with several degrees of freedom. *(2 hours a week, all year.)*

M.E. 510c. Statistical Thermodynamics: Kinetic theory distribution of molecular velocities, transport phenomena, Maxwell-Boltzmann statistics, quantum statistics, partition functions and thermodynamic properties, gases and vapours, compressed gases and liquids, irreversible processes. *(3 hours a week, one semester.)*

M.E. 511c. Advanced Strength of Materials: Plates, unsymmetrical bending, energy methods, theories of failure, torsion of noncircular sections. *(3 hours a week, one semester.)*

M.E. 512c. Directed Special Studies: A special course of studies with content and direction looked after by the Professor directing the thesis project. There may not be formal lectures, however, the course will carry the weight of three hours lectures for one semester.

M.E. 513. Experimental Stress Analysis: An introduction to stress strain determinations, considering brittle coatings, strain gages, photoelasticity, grid methods. Experimental application and interpretation of static and dynamic electrical strain gage methods, photoelastic techniques and other. *(2 hours a week, 3 laboratory hours alternate weeks.)*

MODERN LANGUAGES

Professors: Rev. C. J. Drouillard, C.S.B., Ph.D., Head of the Department.
Lillian McCarthy, Ph.D.

Associate Professors: Albert Thibault, D.-es.-Lettres
Léandre Page, Prof. agrégé
Gustave-Chretein Dispas, Ph.D.

Assistant Professor: A. Urtiaga, Ph.D.

I. THE MASTER OF ARTS DEGREE IN ROMANCE LANGUAGES

Particular Requirements:

In addition to the general requirements and stipulations listed on page 29 ff. for the Master's degree, the following course requirements must be met by all candidates: the successful completion of four full graduate courses in either French or Spanish or both. Not all of the courses listed will necessarily be offered in any one year.

II. DETAILS OF SUBJECTS

510. Romance Philology.

511. The Beginning of the Romance Literatures — a paleongraphic-linguistic study of the earliest monuments of the Romance literatures.

514. History of the French Language from its origins to François Villon.

517. The critical edition of medieval manuscripts (literary and non-literary texts).

540. Rabelais and the Prose writers of the 16th Century.

550. Molière.

552. Corneille.

553. Racine.

555. French Thought in 16th and 17th Centuries.

558. The Novel in 17th Century France.

559. Pascal.

560. The Theatre of Marivaux.

562. Les Encyclopedistes.

570. French Poetry from 1870-1914.

580. André Gide.

581. Sartre.

582. Revolte contre le Romantisme, le dadaisme, l'exploration de l'inconscient.

520. Old French Texts.

590. The theme of "Don Juan" and the philosophy of free personal behaviour, prize and punishment in the Spanish Theatre.

591. Spain as a problem in the literary generation of 1898.

592. The "modernist movement" and the post modernist era in Spanish American literature.

593. Spanish American literature; style, theme and genre since the independence.

Undergraduate honours courses, which may be assigned at the discretion of the Department Head to form part or all of the requirements of the first year of the two year graduate program, may be found in the General Announcement.

PHILOSOPHY

Head of Department: To be appointed.

Professor: Rev. Frederick Temple Kingston, D.Phil.

Associate Professors: Patrick Francis Flood, M.A.
John N. Deck, Ph.D.
*Ralph C. Nelson, Ph.D.
Rev. Leonard A. Kennedy, Ph.D.

Assistant Professor: S. B. Cunningham, M.S.L., Ph.D.

I. THE MASTER OF ARTS DEGREE

Particular Requirements:

Either: (i) At least two and not more than three graduate courses, one of which may be in a cognate field, plus a thesis;

Or: (ii) Three graduate courses, one of which must be a seminar course including a major paper upon which there shall be an oral examination.

Language Requirements:

Graduate students in Philosophy must show a reading ability in two foreign languages in order to be equipped to do research in the two general areas of Philosophy: ancient and mediaeval on one hand, modern and contemporary on the other. They must have a knowledge of Greek *or* Latin, and of French *or* German.

II. DETAILS OF SUBJECTS

551. Problems in Metaphysics: Investigation of certain crucial metaphysical problems arising in the Philosophy of Science.

552. Texts of St. Thomas Aquinas: An analysis of texts of St. Thomas Aquinas with particular emphasis on one of the following: causality, substance, existential reference.

553. History of Ancient Western Philosophy: A study of texts in ancient philosophy with special reference to one of the following writers: Plato, Aristotle, Plotinus.

554. Problems in the History of Late Mediaeval and Renaissance Philosophy: A study of late mediaeval and renaissance philosophical texts as background for early modern philosophy.

555. Problems in Modern French Philosophy: A study of 16th and 17th Century French philosophy with particular emphasis on Montaigne, Pascal, Descartes, Malebranche and Leibniz.

(This course is also listed as French 555 — **French Thought in the 16th and 17th Century.**)

556. Philosophy of Education: Examination of modern and contemporary philosophical writings on education.

557. Problems in Social Philosophy: Investigation of contemporary social philosophy and its historical background.

558. Problems in Practical Philosophy: Examination of texts in the field of practical philosophy, in either Ethics or Aesthetics.

559. Problems in Modern German Philosophy: A textual study of the German idealist movement from Kant to Hegel.

*On leave of absence.

PHYSICS

Professors: Lucjan Krause, B.Sc., M.A., Ph.D., F. Inst. P., Head of the Department.
Geza Szamosi, Ph.D., D.Sc.

Visiting Professor: Vachaspati, M.Sc., Ph.D.

Associate Professors: John Huschilt, M.A., Ph.D.
Edwin E. Habib, B.Sc., Ph.D.
Nigel E. Hedgecock, M.A., Ph.D.
Frank Holuj, M.Sc., Ph.D.
Arie van Wijngaarden, B.Sc., Ph.D.
David Robinson, M.Sc., Ph.D.

Assistant Professor: Hisashi Ogata, M.Sc., Ph.D.

Postdoctorate Fellows and Research Associates:
B. M. Barker, M.S., Ph.D.
W. Berdowski, D.Sc.
M. S. Bhatia, M.Sc., Ph.D.
M. Czajkowski, D.Sc.
B. P. Kibble, M.A., D. Phil.
M. D. Lombardero, B.Sc., Ph.D.
J. R. Thyer, M.Sc., Ph.D.

The Department provides facilities for students wishing to proceed to the degrees of Master of Science and Doctor of Philosophy. The attention of candidates is drawn to the regulations on page 23 governing admission requirements and the requirements for the M.Sc. degree. The candidates must also satisfy the following additional conditions.

Admission Requirements:

The basic qualification for admission consists of a Bachelor's degree with adequate specialization in Physics, obtained with first or second class honours. Students with deficiencies may be permitted to make up these deficiencies by registering initially in a program of undergraduate courses.

I. THE DEGREE OF DOCTOR OF PHILOSOPHY

1. Period of Study:

A minimum of three years in full-time graduate studies is required. Credit for one of the three years may be given for a Master's degree obtained in this department or for graduate work carried out at another institution. Not more than seven years should elapse between registration and completion of the requirements for the degree; an extension of this period may be granted only on recommendation from the department.

2. Course Work:

Candidates will complete a minimum of five graduate courses, of which Physics 555, 631 and 655 are obligatory. Certain courses in mathematics or another science may be accepted for graduate credit if approved by the department. All candidates are expected to participate in departmental seminars.

3. Doctoral Committee:

Within one month after registration each candidate will be assigned to an advisory committee consisting of his research advisor and two other staff members in the Department. The committee will, from time to time, review the candidate's progress and will be present at the final oral examination (defence of the dissertation). The committee may co-opt an additional member from outside of the University who, as expert in the field of physics in which the candidate's research is carried out, will appraise his dissertation and may also be present at the final oral examination.

4. Language Requirements:

A reading knowledge of two modern languages (selected from among French, German and Russian) is expected. Written language examinations are set twice a year in conjunction with the Department of Modern Languages of the University and must be passed at least one year before the date of graduation. The examinations, at which dictionaries may be used, consist of translations into English of excerpts from scientific writings in the languages concerned.

5. Dissertation:

In order to qualify for the degree, each candidate must present a dissertation embodying the results of an original investigation in a branch of physics. Graduate courses form an important but subsidiary part of the program.

The candidate, when requested, shall submit to his chief advisor from time to time portions of his dissertation and a complete draft on a date specified by his advisor and place four typewritten copies of the completed dissertation in the hands of his advisor at least six weeks before convocation. The members of the candidate's committee must sign the dissertation, when approved, on a page immediately following the title page. The candidate shall submit with his dissertation four copies of an abstract of not more than 500 words and four copies of a vita. The abstract will be bound with the dissertation immediately following the certificate of approval and the vita at the end of the dissertation. An additional abstract is required for national bibliographical purposes. The candidate should consult the University Librarian as to the format of the dissertation. Rules governing binding, quality of paper, etc., of the dissertation can be found on page 26.

6. Examinations:

In addition to the language examinations and examinations in the courses, all candidates must pass qualifying examinations covering the general field of physics at the level of the honours course given in this department. Two three-hour papers are written, usually one year after the commencement of graduate studies. The examinations take place in April and September and must be passed at least one year before the date of expected graduation. Other examinations (written or oral) may be set at the discretion of the department.

Each candidate will, on recommendation of his advisory committee, present himself for a final oral examination in defence of his dissertation. This examination will be conducted by a committee which, in addition to the members of the candidate's advisory committee and the external examiner, may include faculty members from other departments. The chairman and extradepartmental members are appointed by the Dean of Graduate Studies in consultation with the Head of the Department.

II. THE DEGREE OF MASTER OF SCIENCE

Particular Requirements:

The course of study for the degree of Master of Science will consist of at least two and not more than three graduate courses and a thesis. One of the courses may be selected from among undergraduate or graduate courses in a cognate field.

Students proceeding to a degree in theoretical physics may be required to pursue a program consisting of five lecture courses, two of which may be taken in the department of mathematics. In this case no thesis will be expected.

A reading knowledge of one modern language (selected from among French, German and Russian) is expected. Written language examinations are set twice a year in conjunction with the Department of Modern Languages of the University. The examination, at which dictionaries may be used, consists of translations into English of excerpts from scientific writings in the language concerned.

III. DETAILS OF SUBJECTS

Not all of the courses listed below will necessarily be offered in any one year.

500. Seminar: Selected topics in theoretical physics.

526. Molecular Spectroscopy: Structure of diatomic molecules; the rotational, vibrational and electronic states and associated band spectra. Raman spectra, vibrational and rotational spectra of polyatomic molecules. Zeeman and Stark effects in molecules and hyperfine structure.

534. Advanced Electronics: Transmission line theory, microwaves, pulse and digital circuits. Network analysis with Fourier and Laplace transforms.

535. Theory of Semiconductors and Semiconductor Devices: Quantum theory of semiconductors. Dynamics of electrons in static and high frequency electric and magnetic fields. Equilibrium statistics, transport theory, diffusion, drift and thermoelectric effects. Characteristics of p-n junctions, heterojunctions and transistor devices.

552. Atomic Physics and Resonance Phenomena: Interactions between magnetic fields and atomic energy levels with special reference to electron-spin resonance and optical pumping phenomena.

555. Quantum Mechanics: General principles of quantum mechanics. Representation of wave equations. Dirac equation. Number representation and the second quantization. Many body problems and identical particles. Scattering theory and the S-matrix. Quasi-particles.

566. Solid State Physics: The study of point groups, Brevais lattices and space groups. Inverse lattices with applications to scattering phenomena. Electric, magnetic and thermal properties of solids; superconductivity and superfluidity. The effects of imperfections and impurities in crystals.

567. Nuclear Physics: Nuclear forces. Group theoretical treatment of angular momentum. Nuclear structure: the shell model, the collective model, the Nilsson model, the quasi-particle model. Nuclear decays and angular correlations. Nuclear reactions: resonance theory, the compound nucleus, direct reactions, the optical model.

577. Theory of Relativity: Lorentz covariant hydrodynamics, thermodynamics and electrodynamics of moving bodies, applications. The principle of equivalence, Riemann space-time, Einstein field equations, crucial experiments, applications to cosmology. (Prerequisite: Physics 450).

626. Molecular Physics: Crystal field theory in the weak and strong coupling schemes. Molecular orbitals; vibrionic interactions. Electronic structure and spectra of molecular complexes; paramagnetism of molecular complexes; paramagnetic and nuclear magnetic resonance. (Prerequisite: Physics 555).

631. Statistical Physics: The many body problem in quantum mechanics, particle number representation. Statistical (density) matrix. The perfect gas, real gases, dense plasma, applications. Theory of macroscopic quantum phenomena. (Prerequisite: Physics 555).

655. Classical and Quantum Field Theory: Variational principles and conservation laws, applictions, field equations and their solutions. Quantization of fields, scalar, vector and spinor fields. Quantum electrodynamics and its applications, renormalization, radiation corrections. (Prerequisite: Physics 555).

666. Quantum Theory of Elementary Particles: Basic properties of classical and quantum fields. Electromagnetic, weak and strong interactions. Isotopic spin. Beta decay, nuclear forces, strange particles and their connections. (Prerequisite: Physics 555).

AREAS OF RESEARCH:

Candidates proceeding to the degrees of M.Sc. and Ph.D. may carry out research in the following fields:

Problems in atomic physics and atomic collisions (L. Krause); Beta- and gamma-ray spectroscopy (E. E. Habib); Electron spin resonance in solids (F. Holuj and N. Hedgecock); Interaction of low energy ions with matter and mass spectroscopy (A. van Wijngaarden); Plasma physics and diagnostics (D. Robinson); Theoretical plasma physics, theory of relativity (G. Szamosi and J. Huschilt); Theoretical nuclear physics (H. Ogata).

POLITICAL SCIENCE

Professor: V. C. Chrypinski, Ph.D.

Associate Professor: W. L. White, Ph.D., Head of Department.

Assistant Professor: E. D. Briggs, Ph.D.

Lecturers: R. H. Wagenberg, M.A.
J. C. Strick, Ph.D., (part time).

I. THE MASTER OF ARTS DEGREE

Particular requirements:

(a) A thesis on some research subject approved by the Department.

(b) An Oral Examination in Political Theory (including the History of Political Thought) and two other fields. Each candidate is expected to read for the examination under the direction of his Advisor.

(c) The completion of a minimum of two graduate courses.

(d) The candidate must have a reading knowledge of at least one language other than English.

II. DETAILS OF SUBJECT

501. Seminar in Political Theory: Selected theories which have influenced modern political philosophy. (Prerequisite: Political Science 452). Staff in Political Science. *(2 hours a week).*

510. Problems in Canadian Government: The development of Canadian autonomy, and its effects on the various institutions of government. (Prerequisite: Political Science 220). Professor White. *(2 hours a week (seminar).)*

515. Seminar in Comparative Government: Selected current issues in national politics of foreign governments. Dr. Chrypinski. *(2 hours a week).*

520. International Organizations: The history, structure and operation of international political organizations, with emphasis on the League of Nations and the United Nations. (Prerequisite: Political Science 443). Professor Briggs. *(2 hours a week (seminar).)*

535. Public Administration: Application of the principles of public administration to selected areas in the Federal Government of Canada. *(2 hours a week (seminar).)*

Undergraduate honours courses, which may be assigned at the discretion of the Department Head to form part or all of the requirements for the first year of the two year graduate program, may be found in the General Announcement.

PSYCHOLOGY

Professors: Rev. R. C. Fehr, C.S.B., Ph.D., Head of Department.
A. A. Smith, Ph.D.
V. B. Cervin, Ph.D.

Associate Professors: Rev. M. A. Record, C.S.B., M.A.
Rev. J. A. Malone, C.S.B., Ph.D.
M. E. Bunt, Ph.D.
J. E. Callagan, Ph.D.

Assistant Professors: H. W. Kirby, Ph.D.
M. Starr, Ph.D.
B. P. Rourke, Ph.D.
S. A. Kushnick, Ph.D.
D. H. Richardson, M.A.

Sessional Instructor: A. Ortiz, M.D.

Professor Emeritus: Brother R. Philip, F.S.C., Ph.D.

I. THE DOCTOR OF PHILOSOPHY DEGREE IN PSYCHOLOGY

1. Course Work

Students must complete successfully at least six graduate courses after the Honours B.A. At least four graduate courses will be taken in the first year of the doctoral program and two courses in the following year. If the student has his Master's Degree in Psychology, at least two graduate courses will be required of him. Up to four courses may be accepted for credit from another university. Further graduate courses are to be left to the discretion of the Advisor and Department Head. Together with the above requirements, the Doctor of Philosophy Degree in the area of Clinical Psychology includes 2000 hours of supervised clinical work. The minimum passing grade in these courses, graduate and undergraduate, is 66%. A student who fails one only of these courses may repeat it once at the discretion of the Department.

2. Doctoral Committee

Each student will be assigned to an advisory committee during the first year of study. The student's advisor will be the chairman of this committee. There will be at least two additional members of the Department of Psychology on the committee. Further members from within or without the University may be added if this is desirable. The advisor will direct the candidate in his choice of courses. The committee will review his progress from time to time, examine his thesis, and take part in his final oral examination.

3. Language Requirements

Every candidate must have a reading knowledge of one modern European language other than English.

4. Dissertation

The principal requirement for the Ph.D. degree in Psychology is the presentation of a dissertation which embodies the result of an original investigation. The results so presented should constitute a significant and original contribution to knowledge.

5. Examinations

The Graduate Record Examinations will be required for all students seeking admission to the Department of Psychology.

In addition to the foreign language examination and examination in courses the student must pass a comprehensive examination and a final oral examination. The comprehensive examination, set by the Department of Psychology, will test the student's mastery of several important areas of Psychology. The examination will be written and may be supplemented by an oral examination. The examination will normally be taken one year after the commencement of Graduate Studies for the doctoral degree and will admit the student who successfully passes it to the candidacy for the doctoral degree. The examination must be passed at least one year before graduation.

During the course of his research, the Doctoral Candidate will present a Progress Report on his dissertation. The Progress Report will be the equivalent of a departmental oral examination of the candidate's research by the entire department.

Then, each candidate will, when recommended by his advisory committee, present himself for a final oral examination in defense of his dissertation. This examination will be conducted by a committee which, in addition to the members of the candidate's advisory committee, may include at least one external examiner. The chairman and extra-departmental members are appointed by the Dean of Graduate Studies in consultation with the chairman of the Department.

II. THE MASTER OF ARTS DEGREE

Particular Requirements:

(i) The course of study will be at least two and not more than three graduate credit courses, one of which may be in a cognate field, and a thesis.

(ii) Three graduate courses, one of which must be a seminar course including a major paper upon which there shall be an oral examination.

The candidate must have a reading knowledge of at least one language other than English. The language shall be chosen in consultation with the Head of the Department. Written language examinations are set twice a year in conjunction with the Department of Modern Languages of the University.

III. DETAILS OF SUBJECTS

The majority of the following courses are seminars.

501. History of Psychology: The origin of experimental psychology and its early development in Europe and America. The development of the main psychological systems. *(2 hours a week, one semester.)*

502. Modern Theories in Psychology: Development of mental measurement and experimental psychology. Theories of the mind and systems of thought including Structuralism, Behaviourism, Gestalt Psychology and Psychoanalysis. (Prerequisite: Psychology 501). *(2 hours a week, one semester.)*

503. Psychoanalysis and Related Fields: The major works of Freud, Jung, Adler, Horney, Sullivan and Fromm. *(2 hours a week.)*

506. Theories of Learning: Discussion of modern approaches to psychology of learning, including mathematical formulation of learning and behavioural processes. *(2 hours a week.)*

507. Symbolic Processes: Discussion of main findings and research in concept formation, problem solving and thinking. *(2 hours a week.)*

508. Advanced Psychology of Learning: Theoretical and experimental analysis of more complex problems of human learning and behaviour. (Prerequisites: Psychology 507 and 508). *(2 hours lectures, 2 hours laboratory a week.)*

510. Renumbered 531 in 1964.

511. Mathematical Methods in Psychology: Introduction to set theory, symbolic logic, probability theory, difference equations, matrices, vector spaces, and other selected topics of abstract algebra. *(2 hours a week.)*

512. Advanced Statistics I: Probability distributions, research design, analysis of variance and covariance, non-parametric methods in research. *(2 hours a week.)*

513. Advanced Statistics II: Introduction to multivariate analysis, regression analysis, least squares methods, factor analysis, discriminant functions etc. (Prerequisites: Psychology 510 and 511). *(2 hours a week.)*

514. Theories of Measurement and Scaling: Introduction to the theory of measurement and psychological scaling, general psychological scaling models, theory of test construction. (Prerequisites: Psychology 510 and 511). *(2 hours a week.)*

520. Renumbered 511 in 1964.

521. Perception and Cognition: Theories of perception and cognition; related research and research methodology, psychophysical scaling, perceptual structuring, learning and motivation as related to perception, social and personality perception, concept formation and symbolic processes. *(2 hours a week.)*

522. Emotions and Motivation: A comparative study of the modern theories of emotion and motivation. *(2 hours a week.)*

530. Renumbered 502 in 1964.

531. Advanced Experimental Psychology: Vision: Theories of vision, psychophysiology of vision; instrumentation and measurement techniques. *(2 hours lectures, 2 hours laboratory a week.)*

532. Advanced Experimental Psychology: Audition: Theories of audition, psychophysiology of audition, instrumentation and measurement techniques. *(2 hours lectures, 2 hours laboratory a week.)*

533. Special Projects in Experimental Psychology: Individual research in one of the areas of vision, audition, learning, perception, or social experimental psychology. (Prerequisites: One of Psychology 507, 508, 520, 530, 531, or 551). *(2 hours lectures, 4 hours laboratory a week.)*

540. Renumbered 503 in 1964.

541. Physiological Psychology: Structure and function of the nervous and endocrine systems in relation to behaviour. Physiological and neural aspects of motivation, emotions, learning, and symbolic processes. *(2 hours lecture, 2 hours laboratory a week.)*

542. Structure and Function of the Brain: An intense study of brain anatomy including brain dissection. (Prerequisite: Psychology 540). *(2 hours lecture, 4 hours laboratory a week (one semester).)*

548. Comparative Psychology: Behaviour in infra-human organisms with emphasis on vertebrates. Experiments on motivation, innate behaviour, learning, retention, and problem solving. *(2 hours lecture, 2 hours laboratory a week.)*

550. Renumbered 571 in 1964.

551. Psychology of Human Interaction: Systematic discussion of principles of verbal and non-verbal human interaction, behaviour controls, attitudes, competition, cooperation, group behaviour, team learning, conflict resolution. Mathematical formulations of social behaviour. *(2 hours a week.)*

552. Experimental Social Psychology: Theoretical and experimental analysis of some problems in social interaction and group behaviour. *(2 hours lectures, 2 hours laboratory a week.)*

553. Contemporary Theories in Social Psychology: Discussion of modern theoretical approaches to social phenomena. *(2 hours a week.)*

560. Renumbered 581 in 1964.

561. Psychology of Personality: Critical evaluation of the current theories of personality. Biological and cultural emphasis in personality development and assessment. Personality structure and determinants; dynamics and style of expression. *(2 hours a week.)*

562. Advanced Abnormal Psychology: Criteria of the normal and abnormal. The organic and psychological sources of mental illness with special emphasis on the etiology, symptoms and dynamics of neuroses, psychoses and psychopathies. Experimental studies of abnormality. *(2 hours a week.)*

563. Developmental Psychology: A survey and critical evaluation of original studies on development of normal children from birth through adolescence. Methods of research in developmental psychology, relative influences of maturation and training, learning and motor skills, social, emotional, moral and intellectual development. *(2 hours a week.)*

570. Renumbered 582 in 1964.

571. Advanced Projective Techniques I (Rorschach): Interpretation of Rorschach, supervised clinical administration. Conducting and attending case conferences. *(2 hours lecture, 2 hours laboratory a week.)*

572. Advanced Projective Techniques II (Tat, Dap, etc.): Administration and interpretation of the Thematic Apperception Test, Draw-A-Person, and selected Sentence Completion Tests. Conducting and attending case conferences. *(2 hours lectures, 2 hours laboratory a week.)*

573. Aptitude Testing I: The administration and interpretation of intelligence, aptitude and interest tests. Case history conferences. *(2 hours lecture, 2 hours laboratory a week.)*

574. Aptitude Testing II: The administration and interpretation of tests of deterioration, brain damage, and special cognitive functions. Case history conferences. *(2 hours lecture, 2 hours laboratory a week.)*

575. Personality Testing: Administration and interpretation of batteries of personality tests and inventories, with supervision. Conducting case history conferences based upon test batteries. *(2 hours lecture, 2 hours laboratory a week.)*

580. Renumbered 552 in 1964.

581. Clinical Practicum I (Counselling and Psychotherapy): Supervised counselling and therapy in hospital setting. Part of clinical internship requirement. (Prerequisites: Psychology 561, 571). *(2 hours lecture a week.)*

582. Clinical Practicum II: Structure and dynamics of the interview. Supervised practice as part of clinical internship requirement. (Prerequisites: Psychology 561, 571). *(2 hours a week.)*

583. Clinical Diagnosis: The principles of diagnostic techniques; validation of diagnoses. Classification of diagnostic categories. Case history conferences. (Prerequisites: Psychology 561, 570, 571). *(2 hours lecture, 2 hours laboratory a week.)*

588. Ethical and Professional Problems in Psychological Practice: The code of ethics for the professional psychologist; special problems in clinical practice. *(2 hours a week; one semester.)*

590. Industrial Psychology: Discussion of basic psychological principles of behaviour, personnel selection, training, safety, limits of human performance, optimum man-machine systems etc. *(2 hours a week.)*

591. Group Dynamics in Industry: Discussion of principles of human organization in industry, cooperation, competition, team work etc. *(2 hours a week.)*

592a,b. Psychology of Communication Processes: Discussion of basic principles of human behaviour in verbal communication, controls of behaviour and man's information processing capacity. *(2 hours a week.)*

GRADUATE STUDENTS MUST ATTEND RESEARCH SEMINARS.

Undergraduate honours courses, which may be assigned at the discretion of the Department Head to form part or all of the requirements of the first year of the two year graduate program, may be found in the General Announcement.

SOCIOLOGY AND ANTHROPOLOGY

Associate Professors: R. A. Helling, Ph.D., Head of the Department.
E. M. O'Hern, Ph.D.

Assistant Professors: J. J. Bond, M.A.
W. Isajiw, M.A.

I. THE MASTER OF ARTS DEGREE

At the graduate level, students in the Department of Sociology and Anthropology will be expected to specialize in Sociology. Within this discipline, there is emphasis on communication, sociology of religion, social organization and inter-group relations.

The graduate credit courses do not necessarily cover all of the material required for the comprehensive oral examination, a necessary condition for the successful completion of the Master's programme. All candidates are expected to prepare themselves for the examination under the direction of the Graduate Faculty of the Department. Each graduate student will follow a course of readings recommended by his chief advisor, taking into consideration the subject of his thesis and his individual academic standing. Students who are required to take the "make-up" year, will start their course of readings during that year. A student with a Bachelor's degree with at least B standing in the final year and in the major subject, may be admitted to the two year Master's programme.

II. PARTICULAR REQUIREMENTS

1. A thesis on some research subject approved by the Department.
2. A comprehensive oral examination in sociological theory, in methodology and two other fields chosen from the following:
   a. social organization including complex organizations, social stratification, community structure, industrial sociology
   b. sociology of religion
   c. sociology of communication
   d. inter-group relations
   e. social psychology.
3. The completion of two or three graduate courses each with at least 66 per cent standing. The number of courses must be decided by the Department.
4. The candidate must have a reading knowledge of at least one language other than English. The language shall be chosen in consultation with the chief advisor. A student who desires to select inter-group relations as one of the subject matters of his comprehensive oral examination, should have a working knowledge of French. The candidate must show evidence of such reading knowledge by passing an examination at the commencement of his graduate studies.

III. DETAILS OF SUBJECTS

501. Contemporary Social Theory: A critical analysis of contemporary schools; neo-positivism, human ecology, functionalism, analytical sociology, sociology of knowledge and historical sociology.

502. Research Seminar: The research process, the use of conceptual models, empirical research methods and the interpretation of research.

503. Sociology of Communication: The study of the interaction between language, human groups and the social structure; communication in contemporary society.

504. Religion and Society: Sociological theories of religion, patterns of religious organization, questions of leadership and communication, religion and socialization, interaction between religion and other social institutions.

505. The Matrix of Modern Society: The analysis of complex and multilevel organizations, social stratification and community power structures, patterns of pluralistic society.

506. Canadian Dualism, American Pluralism and the Open Society: The study of inter-group relations of the North American Continent. Special emphasis is given to French-English dualism in Canada. Problems of culture contacts on other continents.

507. Social Organization of the Canadian Indigenous Population: The study of cultural patterns of native Indians and Eskimos, the problems of transition from pre-literate to urban society.

SPECIAL PROGRAM

INTERDISCIPLINARY STUDIES IN COMMUNICATIONS

Director: S. N. Kalra, Ph.D.

This interdepartmental program of study is offered in Communication Sciences leading to a Master's degree from one of the participating departments. A student so enrolled will have Communications as a field of specialization in the discipline of his graduate studies. The object of this program is to provide the student with an opportunity and climate for interdisciplinary training and research in communications. Communication between man and man, man and machine, and machine and machine is of special interest. The areas of study include language, both natural and artificial; information and information processing by man and machine; and communication systems, both natural and artificial. During the past decade, advances in linguistic studies, psychology, physiology, electrical engineering and mathematics have led to the development of certain techniques of very wide application. This program is designed to encourage the application of these techniques to problems in communications. It will interest students who have graduated with a degree in languages, philosophy, psychology, sociology and anthropology, business administration, engineering, or the sciences.

Problems in communications are complex and their study from an interdisciplinary point of view not only gives a much better understanding of the problem itself, but provides the technique for solution that would otherwise not have been easily available. This program will require the use of scientific methods and techniques to all the problems under study. Facilities include the laboratories of the participating departments, library and a high speed computer, IBM 1620 Mk II.

Academic Regulations and Degrees:

A student must apply for admission to one of the participating departments. He will be governed by all the academic rules and regulations of the School of Graduate Studies and the particular program of studies as arranged by the student's advisor and the director of this program.

Special degrees in Communications will not be awarded.

Computer Science

If a student wishes to specialize in Computer Science, courses in Mathematics and Computer Logic will be required in addition to those listed below.

Courses:

The prerequisites to this course will be registration in the graduate school or 4th year standing (B average minimum) and permission of the department concerned. A knowledge of elementary college Mathematics (Math. 15 and Math. 22 or equivalent) will be required. Each student will be expected to take the following courses in order to bring his knowledge to a certain minimum level:

I.S.C. 500b. Interdisciplinary Seminar in Communications: A tutorial seminar required of all students. *(3 hours a week, second semester, ½ course credit.)*

E.E. 581 *or* **E.E. 583c. Information Theory:** First semester. See the listing under Electrical Engineering Department.

Psychology 592a,b. Psychology of Communication Processes: See the listing under Psychology Department.

Special Program

A student may be excused from any one or more of the three half courses above (Psychology 592a,b; E.E. 581c, 583c), if he can demonstrate his knowledge of the subject to the satisfaction of the instructor concerned.
Thesis or Major paper will be required of each student as per the rules of the Department concerned.

Full Program of a Student:

The full graduate study program of a student will be worked out by his Departmental advisor and the director of Studies in Communications. The full program will include, in addition to the courses mentioned earlier, any courses, seminars, colloquia, etc., that may be required.

FEES

Fees are subject to change without notice. All fees are for the academic year, except where otherwise indicated.

FULL TIME

Tuition	$430.00
Incidentals (payable at registration) (Including: Graduate Student Society, $5; University Centre, $12.50 Registration, Library, Laboratory, Examinations, $22.50).	40.00
Total fees for one-year program	$470.00

Athletic fee . . . to be arranged, dependent on participation.

If the student admitted to the one-year program should take longer than one calendar year to complete his program, his fees will be $430, plus $40 incidental fees each year until he completes the requirements for the degree.

PART TIME

Tuition . . . Part time students in all categories will be assessed $47.50 per hour of instruction (including research and thesis direction), up to and not less than $430 for the full academic year's program.

Incidental fees . . . for each calendar year are as listed below. For a partial calendar year, these fees will be pro-rated. All incidental fees are payable at registration.

	Minimum	Optional: Full membership
Graduate Student Society	$ 2.50	$ 5.00
University Centre	5.00	12.50
Other incidentals	17.50	22.50
Athletic		up to 20.00

MISCELLANEOUS

Payable by all students as incurred.

Late Registration: Full-time	20.00
Part-time	5.00
Graduation "in absentia"	10.00
Special examination, per subject:	
Regular time and place	10.00
Outside regular time and/or place	20.00
Change of course	2.00
Transcript of record (Official)	1.00
(Unofficial)	.50
Evaluation of documents	10.00
Graduate Record Examination (if applicable)	12.50

NON-RESIDENT FEE

(Applies to all foreign students except those whose parents have taken up permanent residence in Canada. Needy students from overseas developing countries may request that this fee be waived; such requests should be addressed to the President of the University, in writing.)

$20 per subject to a maximum of	100.00

Any outstanding balance of fees will be assessed in the student's final session.

PAYMENT OF FEES

Fees are due and payable on the day of registration; they may, however, be paid in two instalments (except overseas students who must pay in one payment) in which case a carrying charge of $5.00 is made. The first instalment is due at the time of registration; the second instalment is due on or before January 17, 1967. A penalty of **$10.00** will be assessed students paying the second instalment after a period of seven days from the opening of the second semester.

Failure to pay this outstanding account will bar a student from writing examinations or obtaining credits for previous work.

A reduction is made in the tuition fees of brothers and sisters attending the University simultaneously as full-time students.

WITHDRAWAL AND REFUND POLICY

Students who are forced to withdraw from a course or from the University, are required to notify the Registrar in writing and to give their reasons for withdrawal. The obligation of teaching and accommodating a student rests on the University on a yearly basis. Hence:

(1) **All tuition credits or refunds shall be made entirely at the discretion of the university.**

(2) Credits or refunds will be made in the following cases only: (a) Cash refunds may be granted in cases where students are compelled to withdraw on account of serious and continued personal illness. (b) Cash refunds may also be granted in cases where the student is compelled to withdraw for other personal reasons provided these are satisfactory to the University authorities.

(3) The portion of the fee refunded is determined by the date application for refund is received in the Registrar's Office—NOT THE DATE OF WITHDRAWAL. If the application is made during the first week of the semester, a refund of 90% of the semester fees will be returned; during the second week, 80%; during the third week, 60%; during the fourth week, 40%. After the fourth week of each semester no refund will be given. Cheques for refunds will be available only six weeks after withdrawal.

RESIDENCE FEES

Room and Board, per academic year: $800.00

An extra charge of $15 is made if the residence fee is paid in two instalments.

Each student who wishes to live on campus must send to the Office of the Director of Residence prior to September 1st a deposit of $25, which will be used as a caution fee. A deposit will be refunded if the reservation is cancelled prior to September 1st.

The Residence Council has a right to place a levy against the caution fee for the social and miscellaneous needs of the residences.

A student who withdraws from residence during the academic year may receive a refund only when such withdrawal is occasioned by circumstances beyond the control of the student and has the prior approval of the Director of Residence.

POSTGRADUATE AWARDS

Students wishing further information on awards listed below should consult the Secretary of the Committee on Student Awards in the Registrar's Office or the Dean of Graduate Studies (unless otherwise specified).

Fellowships:

The University offers a number of fellowships varying in value from $500 to $2,500. For details consult the Head of the Department concerned.

Assistantships:

The University offers a number of assistantships varying in value from $1,500 to $2,500. For details consult the Head of the Department concerned.

Province of Ontario Graduate Fellowships:

A number of fellowships is provided by the Government of Ontario to students in the humanities, social sciences, pure sciences and mathematics, who plan careers in university teaching. The minimum academic qualification is the Ontario Honours Bachelor degree or its equivalent. Stipends range up to $1,500 for the fall session and $500 for the full summer session. For details consult the Dean of Graduate Studies.

Canada Council Awards:

These are provided in the fields of the arts, humanities and social sciences. The awards are in ten categories. The two which are of most interest to students are:

1. Pre-Master's Scholarships. Value $1,500.
2. Pre-Doctor's Fellowships. Value $2,000 plus allowances for necessary travel.

Candidates should apply to the Canada Council, 140 Wellington St., Ottawa, by December 15.

National Research Council Bursaries and Studentships:

These are awarded in open competition to students in the fields of Biology, Chemistry, Physics, Geology, Mathematics, Engineering and Experimental Psychology. The **Bursaries,** valued at $2,000 for twelve months, are normally awarded to the applicants who have had no postgraduate research experience. The **Studentships,** valued at $2,400 for twelve months, are awarded to applicants who have had at least one year's graduate research experience. Applicants must be Canadian citizens normally resident in Canada or foreign students who have been enrolled in a Canadian university for a minimum of twelve months at the time of application. Application should be made directly to the National Research Council in consultation with the Department concerned, before February 1. Further information may be obtained from the Awards Officer, National Research Council, Ottawa 2, Ontario, or from the appropriate Department.

Canadian Federation of University Women Junior Fellowship:

This fellowship, valued at $1,500 is open to any woman holding a degree from a Canadian University who is not over twenty-five years of age and whose domicile is in Canada. Apply to Mrs. C. E. Smith, Chairman, Fellowships Committee, 2424 Crown Crescent, Vancouver, B.C., before February 1.

Consolidated Mining and Smelting Company of Canada Ltd. Graduate Research Fellowships:

Chrysler Canada Ltd. Scholarship:

Value: $1,500. Awarded annually to an outstanding graduate student entering the first year of the Master of Business Administration program.

These fellowships of $2,200 are offered annually to Canadian citizens for research at Canadian universities toward a postgraduate degree in pure or applied science or agricul-

ture bearing some relationship to the broad technical interests of the Company in the fields of mining, geology, metallurgy, chemistry, chemical engineering, physics, agriculture, and electrical, mechanical and civil engineering.

Ten fellowships are offered — five tenable in Western Canadian universities and five in Eastern Canadian universities.

Application must be made on the approved forms and submitted to the Canadian Universities Foundation, 75 Albert St., Ottawa 4, Ont., by February 1.

Federal-Provincial Student-Aid Bursaries:
Under this programme, Bursaries may be awarded to students in financial need who are resident in Ontario. To be eligible, students must have obtained not less than sixty-six per cent at their last examination and must currently be in their qualifying or make-up year. Further information may be obtained from the Registrar of the University.

H. J. Heinz Company of Canada Ltd. Scholarship:
Value: $1,250. Awarded annually to an outstanding Canadian student entering the first year of the Master of Business Administration program.

Chrysler Canada Ltd. Scholarship:
Value: $1,500. Awarded annually to an outstanding graduate student entering the first year of the Master of Business Administration program.

Hiram Walker and Sons Ltd. Scholarship:
Value: $1,250. Awarded to a graduate student entering the first year of the Master of Business Administration program.

British American Oil Company Limited Canadian-American Graduate Research Fellowship:
Value $500. Awarded annually to a student registered in the final year of the M.A. program for research into problems of Canadian-American Studies. Applications may be obtained from the Department of History, and must be submitted to the Director of the Canadian-American Relations Seminar.

Imperial Oil Graduate Research Fellowships:
The Imperial Oil Limited offers annually five research fellowships of $2,500 per year in Canadian funds for a period up to three academic years. Three fellowships are offered in the fields of pure and applied science including mathematics, and two are offered in the social sciences and humanities. These are open to graduates of any approved university in Canada and may be held at any university, approved by the donor, for graduate studies leading to a doctor's degree.

Students who wish to be recommended by the University should apply to the Secretary of the Committee on Student Awards not later than February 15 so that the formal application may be submitted before March 1.

International Nickel Graduate Research Fellowships:
A number of fellowships of $2,500 each has been established to encourage academic research in the technical fields serving Canadian metal industries and to stimulate advanced study in industrial science in Canada. The normal tenure is one year, but application may be made for renewal through second or third year. The fields of research are: chemistry or physics of metals, geology (including geophysics and geochemistry), metallurgy and mining.

Students who wish to be recommended by the University for these awards should apply to the Secretary of the Committee on Student Awards not later than January 31 so that the formal application may be submitted by February 14.

Postgraduate Awards

Queen Elizabeth II Ontario Scholarships:

In honour of the visit of Her Majesty, Queen Elizabeth II to Ontario in July, 1959, the Government of the Province established a fund to provide annually a number of post-graduate awards in the fields of the humanities, social sciences and mathematics, to candidates nearing the completion of the Ph.D. degree.

The minimum academic requirements are two years of graduate work beyond the Ontario Honours B.A. degree or its equivalent. Preference will be given to candidates who are residents of Ontario.

Apply to the Dean of Graduate Studies before December 1.

Woodrow Wilson National Fellowships:

These fellowships, each providing a stipend of $1,800 for one year, plus tuition costs and allowances for dependents, are available to outstanding students who are either under-graduates in their final year or graduates who have not yet entered a liberal arts graduate school. The intention of all applicants must be to prepare themselves by graduate study for a career in college teaching in the natural or the social sciences or the humanities.

Since nominations must reach the officers of the Fellowship Foundation no later than October 31 for fellowships tenable in the next academic year, candidates should contact the Assistant to the Dean of Arts and Science as early as possible in the first semester. Students are invited to consult several publications which provide information regarding fellowships and scholarships open to graduates of the University of Windsor in Canada and abroad, and which are available in the office of the Dean of Graduate Studies.

LOANS AND OTHER FORMS OF AID

Provincial Student Aid Loans:

Loans are available from this fund to enable Ontario students who have achieved III Class on their previous year's work, to undertake or to continue university courses. Maximum amount for one year: ordinarily $500; maximum amount for all years: ordinarily $2,000. The loan is without interest until April 1 in the year following graduation or withdrawal; thereafter, interest at 4% per annum is charged on the unpaid portion. For details, apply to the Office of Student Affairs.

University of Windsor Loans:

Sincere students in serious need, who have academic promise (normally C standing or better) are eligible for loan assistance provided they have already applied for all other forms of assistance for which they are eligible. Minor loans range from $25 to $100 and must be repaid within one month. Major loans range from $101 to $500; they are usually meant to support a student for his second semester fees, and should be applied for not later than December 15. For further information consult the Office of Student Affairs.

The Children of War Dead (Education Assistance) Act:

Passed on July 1, 1953, this Act provides assistance towards an education beyond secondary school level for sons and daughters of veterans whose deaths were attributable to service in World War I, World War II, or the Korean operations. If the application is approved the Department of Veterans Affairs will pay

(a) to the student, an allowance of $25 per month for the period during which he or she is pursuing a full time course, up to a maximum of 36 months;

(b) to the university, fees and other costs of tuition as described in the Act, up to a maximum of $500 per academic year.

For further details consult the local office of the DVA.

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Walkerville Printing Company Limited, Windsor, Ontario