



OAKLAND UNIVERSITY ROCHESTER, MICHIGAN

1967-68

GRADUATE BULLETIN OAKLAND UNIVERSITY

UNIVERSITY CALENDAR

1967-1968

FALL SEMESTER

September 6	Wednesday	Convocation Exercises
September 7	Thursday	Advising and Registration
September 8	Friday	Advising and Registration
September 11	Monday	Classes begin
November 23	Thursday	Thanksgiving recess
November 27	Monday	Classes resume
December 20	Wednesday	Last day of classes

WINTER SEMESTER

January 2	Tuesday	Advising and Registration
January 3	Wednesday	Advising and Registration
January 4	Thursday	Classes begin
February 29	Thursday	Winter recess
March 4	Monday	Classes resume
April 17	Wednesday	Last day of classes
April 20	Saturday	Commencement

SPRING SEMESTER

April 26	Friday	Advising and Registration
April 29	Monday	Classes begin
May 30	Thursday	Holiday
July 4	Thursday	Holiday
August 9	Friday	Last day of classes
August 10	Saturday	Commencement

1968

SUMMER SESSION

June 17	Monday	Registration and classes begin
July 4	Thursday	Holiday
August 9	Friday	Last day of classes

OAKLAND UNIVERSITY

Oakland University is a state-supported institution which centers its undergraduate program in the liberal arts and sciences. The University also offers professional training in teacher education, business administration, and engineering. The University's academic structure consists of a College of Arts and Sciences, a School of Education, a School of Engineering, and a School of Performing Arts. In addition, authorization has been given for a School of Business and Economics.

Graduate Programs

The College of Arts and Sciences offers programs leading to the Master of Arts degree in English, mathematics, and psychology and to the Master of Science degree in chemistry and in physics. The School of Education offers the Master of Arts in Teaching in elementary education and in reading instruction. The School of Engineering offers a program leading to the degree of Master of Science in Systems Engineering.

The College of Arts and Sciences and the School of Education offer jointly programs leading to the Master of Arts in Teaching in English and mathematics.

The Three-Semester Plan

Oakland was one of the first institutions in the country to put its entire academic program in year-round operation. Under the three-semester (or trimester) plan, students may attend classes for three fifteen-week semesters a year. There are advantages for both the student and the University in such a plan: the student may gain time in his productive career, and the University may make the most efficient possible use of its facilities.

The Campus and Buildings

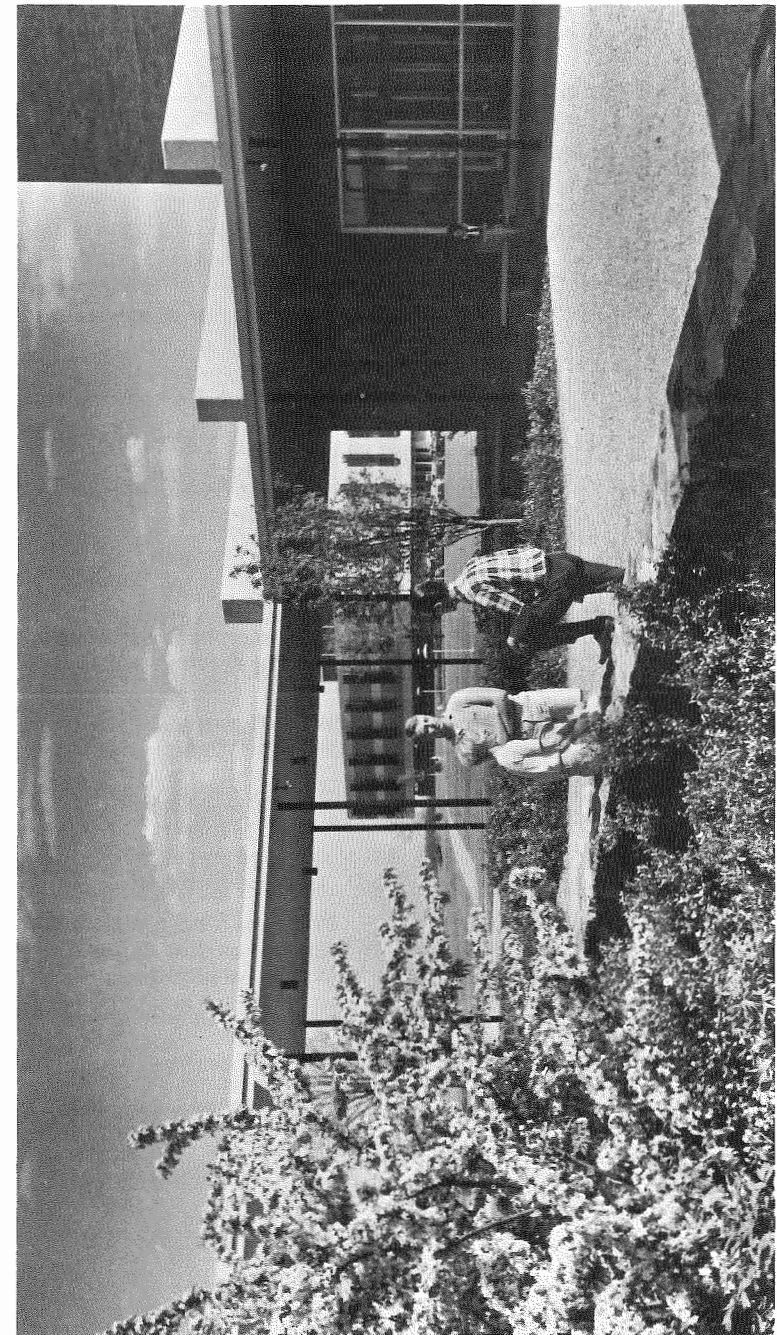
Oakland University is located 25 miles north of Detroit, midway between Rochester and Pontiac. The campus occupies the northwest corner of the 1400-acre estate given to

establish the University by Mr. and Mrs. Alfred G. Wilson, who also donated funds for its first academic buildings, North and South Foundation Halls.

In the fall of 1959, with Durward B. Varner as Chancellor and a faculty of 25, the University admitted its first students. Enrollment has grown from 570 that fall to an expected enrollment of 3900 in the fall of 1967. The campus has been expanded to include 17 major buildings; the Dodge Hall of Engineering and a new dormitory are under construction. In the planning stage are a new health center, another classroom-office building, and the expansion of the Oakland Center to twice its present size.

Governance

Oakland University is affiliated with Michigan State University. Both institutions have the same President and Board of Trustees. Oakland has its own Chancellor and University organization responsible for developing its individual role, character, and functions.



THE FACULTY OF THE GRADUATE PROGRAMS

- D. B. VARNER** *Chancellor*
B.A., Texas A & M; M.S., University of Chicago
- DONALD D. O'DOWD** *Professor of Psychology;
Provost*
A.B., Dartmouth College; M.A., Ph.D., Harvard University
- HARVEY J. ARNOLD** *Associate Professor of Mathematics*
B.A., M.A., Queen's University, Canada;
M.A., Ph.D., Princeton University
- EDWARD A. BANTEL** *Professor of Education and
Psychology*
B.A., M.A., Ed.D., Columbia University
- JOHN G. BLAIR** *Associate Professor of English*
B.A., Brown University; M.A., Columbia University;
Ph.D., Brown University
- DAVID E. BODDY** *Assistant Professor of Engineering*
B.S.M.E., M.S.E.E., Ph.D., Purdue University
- LOUIS R. BRAGG** *Professor of Mathematics*
A.B., M.S., West Virginia University; Ph.D., University of Wisconsin
- GOTTFRIED BRIEGER** *Associate Professor of Chemistry*
B.A., Harvard University; Ph.D., University of Wisconsin
- MAX BRILL** *Visiting Assistant Professor of Psychology*
B.S., Ohio State University
- MAURICE BROWN** *Associate Professor of English*
B.A., Lawrence College; M.A., Ph.D., Harvard University
- HARVEY BURDICK** *Professor of Psychology;
Chairman, Department of Psychology*
B.A., Syracuse University; Ph.D., University of Minnesota
- ROBERT C. BUSBY** *Assistant Professor of Mathematics*
B.S., Drexel Institute of Technology;
A.M., Ph.D., University of Pennsylvania
- NGUYEN PHUONG CAC** *Assistant Professor of
Mathematics*
Licence es Sciences, Saigon University;
M.Sc., University of London;
Ph.D., University of Cambridge
- HAROLD C. CAFONE** *Assistant Professor of Teacher
Education*
B.A., Brooklyn College; M.A., Columbia University;
Ed.D., University of Arizona

- MELVIN CHERNO** *Associate Professor of History*
B.A., Stanford University; M.A., University of Chicago;
Ph.D., Stanford University
- F. JAMES CLATWORTHY** *Instructor in Teacher Education*
B.A., M.A., Cand. Phil., University of Michigan
- KENNETH H. COFFMAN** *Assistant Professor of
Psychology;
Director of Psychological Services*
B.S., Greenville College; M.S., Illinois State University;
Ph.D., Northwestern University
- KENNETH R. CONKLIN** *Assistant Professor of Teacher
Education*
B.S., M.S., Ph.D., University of Illinois
- BRUCE R. DANNER** *Instructor in Physics*
B.A., DePauw University; M.A., State University of Iowa
- JAMES E. DAVIS** *Assistant Professor of Chemistry*
B.A., Mississippi State University;
Ph.D., Massachusetts Institute of Technology
- JOSEPH W. DeMENT** *Associate Professor of English*
A.B., University of Redlands; Ph.D., Indiana University
- JOHN W. DETTMAN** *Professor of Mathematics*
A.B., Oberlin College; M.S., Ph.D., Carnegie Institute of Technology
- ROBERT H. EDGERTON** *Associate Professor of
Engineering*
B.S., M.S., University of Connecticut;
Ph.D., Cornell University
- PETER G. EVARTS** *Assistant Professor of English*
B.A., Eastern Michigan University;
M.A., University of Michigan
- THOMAS FITZSIMMONS** *Professor of English*
B.A., Stanford University; M.A., Columbia University
- WILLIAM C. FORBES** *Associate Professor of Biology*
A.B., M.A., Kent State; M.A., Ed.D., Columbia University;
Ph.D., University of Connecticut
- LAWRENCE B. FRIEDMAN** *Assistant Professor of
Chemistry*
B.A., University of Minnesota (Duluth);
M.A., Ph.D., Harvard University
- JON FROEMKE** *Assistant Professor of Mathematics*
B.A., M.A., University of Nebraska
- JOHN E. GIBSON** *Professor of Engineering;
Dean, School of Engineering*
B.S., Rhode Island State College;
M.Eng., Ph.D., Yale University
- HARRY T. HAHN** *Professor of Education*
B.S., Kutztown State College; M.Ed., Ed.D., Temple University

WILLIAM G. HAMMERLE *Professor of Engineering*
B.S., California Institute of Technology;
Ph.D., Princeton University

RICHARD E. HASKELL *Assistant Professor of Engineering*
B.E.E., M.E.E., Ph.D., Rensselaer Polytechnic Institute

LASZLO J. HETENYI *Professor of Education;
Dean, School of Education*
B.A., Pennsylvania State University; M.A., University of Michigan; Ed.D., Michigan State University

EDWARD J. HEUBEL *Professor of Political Science;
Chairman, Department of Political Science*
B.A., Yale University; M.A., Ph.D., University of Minnesota

DONALD C. HILDUM *Associate Professor of Psychology*
A.B., Princeton University; M.A., Ph.D., Harvard University

J. CARROLL HILL *Associate Professor of Engineering*
B.S.E.E., University of Louisville; M.S.E.E., University of Southern California; Ph.D., Purdue University

ROBERT HOOPES *Professor of English;
Chairman, Department of English*
A.B., Cornell College; A.M., Boston University;
A.M., Ph.D., Harvard University; D.Lit (hon.), Cornell College

DON R. IODICE *Assistant Professor of French*
B.A., M.A.T., Yale University

GLENN A. JACKSON *Assistant Professor of Engineering*
B.S., M.A., University of Denver; Ph.D., University of Michigan

THOMAS M. JENKINS *Instructor in Mathematics*
B.A., Kenyon College; M.A., Yale University

G. PHILIP JOHNSON *Professor of Mathematics;
Chairman, Department of Mathematics*
B.S., M.A., Ph.D., University of Minnesota

RICHARD A. KAMMANN *Assistant Professor of Psychology*
B.A., Miami University (Ohio); Ph.D., University of Cincinnati

KEITH R. KLECKNER *Associate Professor of Engineering*
B.E.E., Ph.D., Cornell University

AHARON KUPERMAN *Assistant Professor of Psychology*
B.S., M.S., Illinois Institute of Technology;
Ph.D., Washington University

JOHN H. LANGER *Assistant Professor of Education*
Ph.B., M.A., University of Detroit; Ed.D., Wayne State University

C. PETER LAWES *Instructor in Mathematics*
B.S., M.S., Massachusetts Institute of Technology;
M.A., Dartmouth College

CARMINE ROCCO LINSALATA *Professor of Spanish*
B.A., M.A., Ohio State; Ph.D., University of Texas

DAVID G. LOWY *Assistant Professor of Psychology;
Clinical Psychologist*
B.A., Drake University; M.A., City College of New York;
Ph.D., University of Tennessee

RICHARD S. LYONS *Associate Professor of English*
A.B., Carleton College; Ph.D., Princeton University

DONALD G. MALM *Associate Professor of Mathematics*
B.S., Northwestern University; A.M., Ph.D., Brown University

GEORGE T. MATTHEWS *Professor of History;
Dean, College of Arts and Sciences*
A.B., M.A., Ph.D., Columbia University

JAMES H. MCKAY *Professor of Mathematics*
B.A., Seattle University; M.S., Ph.D., University of Washington

JOHN M. MCKINLEY *Associate Professor of Physics*
B.S., University of Kansas; Ph.D., University of Illinois

STEVEN R. MILLER *Assistant Professor of Chemistry*
B.S., Case Institute of Technology; Ph.D., Massachusetts Institute of Technology

RALPH C. MOBLEY *Professor of Physics;
Chairman, Department of Physics*
B.S.E.E., Lawrence Institute of Technology;
M.S., Ph.D., University of Wisconsin

DONALD E. MORSE *Assistant Professor of English*
B.A., Williams College;
M.A., Ph.D., University of Connecticut

JACK R. MOELLER *Associate Professor of German*
B.A., Oberlin College; M.A., Ph.D., Princeton University

ROSS A. NORRIS *Assistant Professor of Art*
B.A., North Central College;
M.A., M.F.A., Ph.D., University of Wisconsin

FREDERICK W. OBEAR *Associate Professor of Chemistry;
Assistant Provost*
B.S., Lowell Technological Institute;
Ph.D., University of New Hampshire

L. CROCKER PEOPLES *Assistant Professor of Psychology*
B.S., Carson Newman College; Ph.D., University of Tennessee

JOEL W. RUSSELL *Assistant Professor of Chemistry*
B.A., Northwestern University; Ph.D., University of California (Berkeley)

RODERIC E. RIGHTER *Assistant Professor of Education;
Associate Dean, School of Education*
A.B., B.S., Ashland College; M.E., Bowling Green State University; Ed.D., Wayne State University

RALPH J. SCHILLACE *Instructor in Psychology*
B.A., Fenn College; M.A., University of Cincinnati

WILLIAM SCHWAB *Professor of English*
B.A., Bethany College; M.A., Ph.D., University of Wisconsin

RICHARD R. SHANK *Associate Professor of Engineering;*
Associate Dean, School of Engineering
B.E., M.E., Yale University

DAVID W. SHANTZ *Assistant Professor of Psychology*
B.A., Bethel College; M.S., Ph.D., Purdue University

MARSHALL J. SHEINBLATT *Assistant Professor of*
Physics
A.B., Harvard College;
M.S., Northeastern University

HARVEY A. SMITH *Associate Professor of Mathematics*
B.S., Lehigh University; M.S., A.M., Ph.D., University of
Pennsylvania

RICHARD L. SPROTT *Assistant Professor of Psychology*
A.B., M.A., Ph.D., University of North Carolina

W. PATRICK STRAUSS *Associate Professor of History*
A.B., Occidental College, Los Angeles; M.A., Stanford University;
Faculte des Lettres, University of Paris; Ph.D., Columbia
University

BEAUREGARD STUBBLEFIELD *Associate Professor*
of Mathematics
B.S., M.A., Prairie View College;
M.S., Ph.D., University of Michigan

S. BERNARD THOMAS *Associate Professor of History*
B.S., City College of New York;
M.A., Ph.D., Columbia University

PAUL A. TIPLER *Assistant Professor of Physics*
B.S., Purdue University; M.S., Ph.D., University of Illinois

PAUL TOMBOULIAN *Professor of Chemistry;*
Chairman, Department of Chemistry
A.B., Cornell University; Ph.D., University of Illinois

REUBEN TORCH *Professor of Biology;*
Associate Dean, College of Arts and Sciences
B.S., M.S., Ph.D., University of Illinois

IRVING TORGOFF *Associate Professor of Psychology*
B.S., City College of New York;
Ph.D., University of Rochester

LIBOR J. VELINSKY *Assistant Professor of Physics*
B.A., Vanderbilt University; M.A., University of Rochester;
Ph.D., Michigan State University

GILBERT L. WEDEKIND *Assistant Professor of*
Engineering
B.S., M.S., Ph.D., University of Illinois

GERTRUDE M. WHITE *Professor of English*
B.A., Mt. Holyoke College; M.A., Columbia University;
Ph.D., University of Chicago

MARILYN L. WILLIAMSON *Assistant Professor of*
English
B.A., Vassar College; M.A., University of Wisconsin;
Ph.D., Duke University

ROBERT M. WILLIAMSON *Professor of Physics*
B.S., University of Florida; Ph.D., University of Wisconsin

HOWARD R. WITT *Associate Professor of Engineering*
B.A.Sc., University of Toronto;
M.S.E., Princeton University;
Ph.D., Cornell University

COMMITTEE ON GRADUATE STUDY

G. PHILIP JOHNSON, Chairman	Professor of Mathematics; Chairman, Department of Mathematics
RICHARD M. BRACE	Professor of History; Chairman, Department of History
JOHN E. GIBSON	Professor of Engineering; Dean, School of Engineering
LASZLO J. HETENYI	Professor of Education; Dean, School of Education
RALPH C. MOBLEY	Professor of Physics; Chairman, Department of Physics
WILLIAM SCHWAB	Professor of English
PAUL TOMBOULIAN	Professor of Chemistry; Chairman, Department of Chemistry
ROBERT C. HOWES	Professor of History; Assistant Provost

TUITION AND FEES

Tuition Charges

Tuition is assessed each semester on the basis of the credit value of the courses carried, as follows:

	Michigan Residents	Non-Residents
1- 4 Credits	\$104	\$253
5- 9 Credits	182	445
10+ Credits	257	622

(All fees are payable at registration)

Other Fees

A fee of \$10 must accompany an application for admission to a program. The fee for a Permit to Register is \$5. These are processing fees and are not refundable.

Students registering or paying fees after regular registration date are required to pay an additional, non-refundable fee of \$15 for the first day, plus \$5 a day until a maximum of \$25 is reached.

An additional fee of \$5 per credit is charged for all courses repeated.

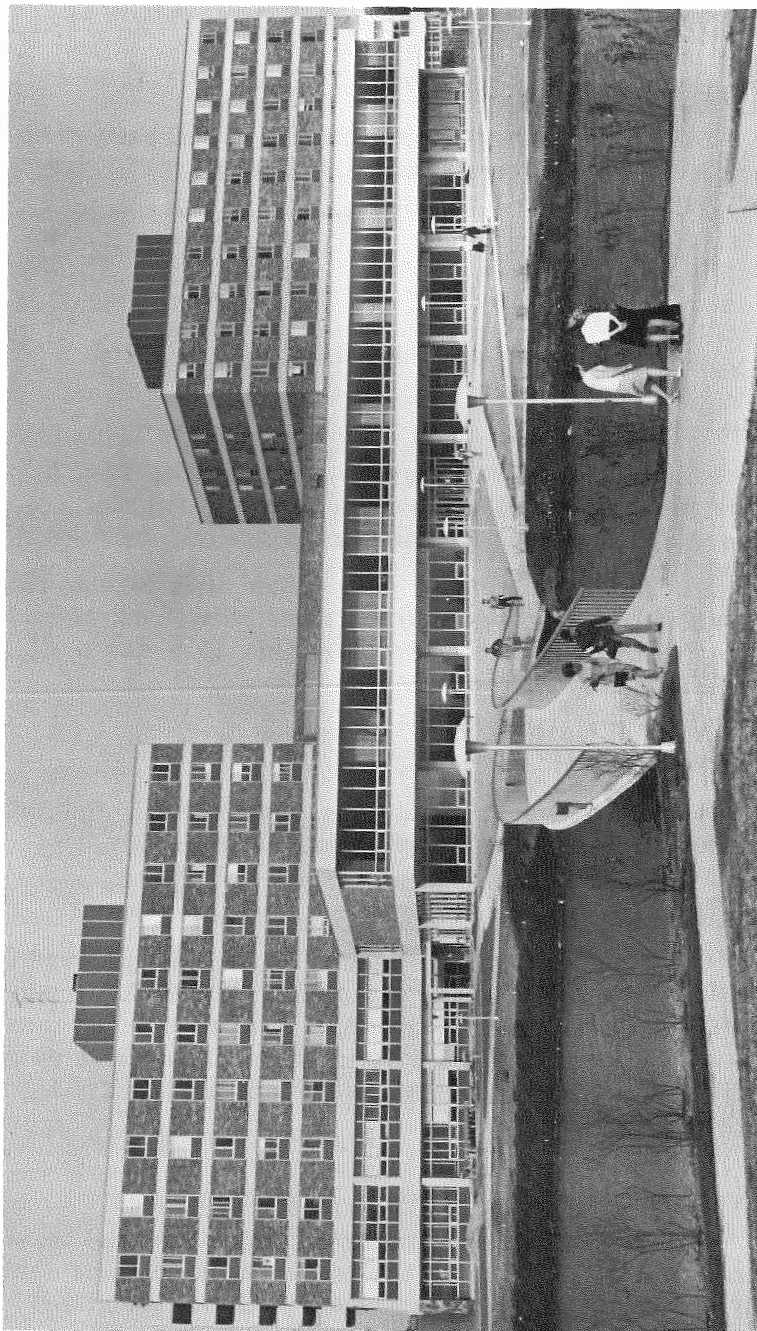
A fee of \$5 per semester is charged each full-time student to cover the use of the student health facility.

Resident Housing

Graduate students interested in dormitory housing should contact the Director of Housing, Oakland University, for further information. Requests for room reservations must be accompanied by a \$25 deposit which is refundable up to July 1, if the University is notified. Room and board charges are \$445 per semester.

Financial Aid

Oakland University attempts to provide financial assistance to full-time graduate students who do not have sufficient funds to finance their education. This aid is offered in



the form of graduate assistantships, National Defense Education Act Loans and, in some cases, campus jobs.

A limited number of graduate assistantships are available to qualified graduate students in the departments offering graduate work. All graduate students who receive assistantships are exempt from out-of-state fees, but must pay in-state fees according to the University schedule for the number of credits taken. Stipends range up to \$2400 for two semesters depending on the nature of the assignment and hours of work involved. Inquiries and application should be addressed to the chairman of the department in which the assistantship is desired. Applicants not currently enrolled at Oakland University should have on file with the Office of Admissions an application for admission to graduate study.

Grades and Grade Point System

Oakland has a numerical grading system ranging in tenths from 0.0 to 4.3. This system is not related to numerical or letter equivalents. Grades from 2.0 to 4.3 are in the range necessary for credit toward a degree, but grades from 0.0 to 1.9 are in the penalty range. The numbers 0.1, 0.2, 0.3 and 0.4 are not used.

Oakland University grades may be described as follows:

- 4.3 highest grade
- 4.0 excellent
- 3.0 good
- 2.0 satisfactory
- 0.0 failure; no credit

Grades assigned in graduate courses will follow the same system observed for undergraduate courses, except that no credit for a course with a final grade below 2.0 may be applied toward a Master's degree. To qualify for a Master's degree, a candidate's record must show an average of at least 3.0 in all courses taken at Oakland University as a graduate student.

ADMISSIONS PROCEDURE

Admission to Course

1. The graduate admissions-to-course policy of Oakland University is selective. Admission will be granted upon recommendation of the department concerned on the basis of the applicant's undergraduate record, letters of recommendation and such other evidence as may be required by the department concerned.

2. An applicant must have an approved baccalaureate or its equivalent from an undergraduate institution. The degree must have been conferred within the past ten years, with admission to course possible to applicants with degrees older than ten years by special consent of the department concerned.

3. Application for admission to course must be accompanied by official record of work done at all undergraduate and graduate institutions applicant has attended.

Acceptance into Degree Candidacy

1. Admission to course neither confers nor implies that a student will be accepted into degree candidacy.

2. By the time each student has attempted three courses (12 credits) in graduate standing, he must apply to his sponsoring department for degree candidacy.

3. On the occasion of application to degree candidacy the department will decide:

- a. to accept the student as a degree candidate.
- b. to permit him to pursue further work on a non-matriculated basis.
- c. to recommend withdrawal from the University.

4. Departmental recommendation will normally be regarded as final, unless a student wishes to enter special petition to the Committee on Graduate Studies.

Permit to Register

Students who plan to attend Oakland for a maximum of twelve semester hours may apply for admission under a Permit to Register. Application forms may be obtained from the Admissions Office and must be returned with an official transcript of credits from the applicant's undergraduate institution. The applicant should also submit official or unofficial transcripts from institutions in which he earned graduate credit.

Upon receipt of a completed application for a Permit to Register, the Admissions Office will contact the department or departments concerned to determine if the applicant can be admitted to the course or courses for which he has applied.

Admission under a Permit to Register neither implies nor precludes subsequent admission to a regular degree program at Oakland should the student apply for such admission at a later date.

Special Admissions

Special admission may be granted to those students who are not yet fully qualified to enter a graduate program. Such students may, for example, be admitted in order to complete undergraduate courses required for admission to one of the regular graduate programs.

Information concerning the *Permit to Register* and *Special Admissions* may be obtained from the Office of Admissions.

Physical Examinations

All graduate students planning to take more than eight semester hours of credit per semester and all graduate assistants are required to have a physical examination from their personal physician. The physical examination form will be mailed to the applicant if admission is granted. This form must be completed and returned prior to registration.

DEPARTMENT OF CHEMISTRY

Professors:

Paul Tomboulion, *Chairman*

Associate Professors:

Gottfried Brieger

Frederick W. Obear

Assistant Professors:

James E. Davis

Lawrence B. Friedman

Steven R. Miller

Joel W. Russell

THE MASTER OF SCIENCE IN CHEMISTRY

The Master of Science program in chemistry is designed specifically for full-time students who enter in the fall semester and are candidates for the degree. Placement examinations will be administered by the department in the fall, before registration. The well-prepared student should be able to complete the program in three semesters; in no case should more than five semesters be required. All graduate students must receive approval of the departmental Graduate Program Adviser before enrolling in courses.

Teaching assistantships are available in varying amounts. The awarding of assistantships is at the discretion of the department. In 1967-68 an assistantship requiring twelve hours of work a week for two semesters will pay \$2,400. Assistantships for lesser amounts are also available.

Acceptance into Degree Candidacy

An applicant for admission to the Master of Science program should have received a bachelor's degree within the past five years from an accredited institution. He should have completed not fewer than 36 semester hours in chemistry (including all major areas), 12 hours in mathematics (calculus and above), and 8 hours in physics. A grade-point average of at least 2.75 (on a 4.0 scale) in these courses is usually required.

At least two letters of recommendation from persons familiar with the applicant's educational background are required. The Graduate Record Examination may be required.

Any of the above requirements may be waived at the option of the department.

Requirements for the Degree

The candidate for the Master of Science degree in chemistry must complete the following requirements: 30 credits in courses carrying graduate credit, of which 24 credits must be in chemistry. Of these 24 credits, 16 must be from four of the following areas: biochemistry, inorganic chemistry, organic chemistry, physical chemistry, and analytical chemistry. The candidate must have a satisfactory grade-point average and must have demonstrated accomplishment or made satisfactory progress in research. He must pass a final master's examination (or examinations) which will be given no more than once a semester, and he must demonstrate reading proficiency in a foreign language.

CHM 312 Inorganic Chemistry—4 credits

Development of atomic theory, chemical periodicity, molecular structure, and chemical properties of selected inorganic compounds.

Prerequisite: CHM 244.

Prerequisite or Corequisite: CHM 245.

CHM 317 Inorganic Chemistry Laboratory—1 credit

Advanced preparatory techniques; methods of purification and analysis.

Prerequisite or Corequisite: CHM 312.

CHM 324 Analytical Chemistry—2 credits

Advanced quantitative techniques and measurements; theory and application of modern analytical methods.

Prerequisites or Corequisites: CHM 237, CHM 245, PHY 152.

CHM 328 Analytical Chemistry Laboratory—2 credits

Laboratory coordinated with CHM 324.

Corequisite: CHM 324.

CHM 346 Spectroscopy Laboratory—4 credits

Experimental techniques of spectroscopy; infrared, ultra-violet, nuclear magnetic resonance, and mass spectrometry. Instrument design and performance, sampling methods, and applications are examined.

Prerequisite or corequisite: CHM 245.

CHM 351 Biochemistry—3 credits

An introduction to molecular biology and the chemistry of biological macromolecules; proteins and nucleic acids, enzymology, bio-energetics, and metabolic cycles.

Prerequisite: CHM 234.

CHM 357 Biochemistry Laboratory—1 credit

Prerequisite or corequisite: CHM 351.

CHM 387 Advanced Preparations—2 credits

Special laboratory work in selected areas emphasizing advanced techniques.

Prerequisite: Permission of the department.

CHM 400 Seminar—1 credit

Regularly scheduled discussions of all fields of current interest in chemistry; presented by students, faculty, and visitors.

CHM 405 Selected Topics—2, 4, or 6 credits

Advanced study in special areas: seminars, laboratory work, and readings.

Prerequisite: Permission of the department.

CHM 413 Advanced Inorganic Chemistry—4 credits

A study of the families of elements and classes of compounds from the standpoint of molecular structure and the rates and equilibria involved in chemical reactions.

Prerequisite: CHM 312.

CHM 422 Advanced Analytical Chemistry—4 credits

Detailed treatment of the theory and applications of modern analytical methods.

Prerequisite: CHM 324.

CHM 426 Instrumentation—3 credits

Analysis of design and operation of instrumental equipment; includes laboratory.

Prerequisites: CHM 238, 248, 328; PHY 158.

CHM 431 Organic Synthesis—4 credits

Theory and practice of synthetic and degradative methods of organic chemistry. Preparative reactions from the recent chemical literature will be emphasized.

Prerequisites: CHM 235, 245.

CHM 433 Organic Mechanisms—4 credits

Application of modern electronic theory to the structures and reactions of organic compounds.

Prerequisites: CHM 235, 245.

CHM 434 Natural Products—4 credits

The application of modern synthetic and analytical methods in selected areas of natural product chemistry.

Prerequisites: CHM 235, 245.

CHM 442 Kinetics—4 credits

Kinetic theory of gases, equilibrium and transport properties of gases, intermolecular forces, collision theory of reaction rates, mechanism of reactions, homogeneous catalysis, transition-state theory, absolute rate theories, surface reactions, and photoreactions.

Prerequisite: CHM 245.

CHM 444 Quantum Chemistry—4 credits

Lagrangian and Hamiltonian mechanics, derivation of quantization for simple systems, approximate methods for solution of more complex systems, angular momentum, molecular orbital and valence bond theory, and interpretation of molecular electronic spectra.

Prerequisites: CHM 245, PHY 371, MTH 254.

CHM 452 Advanced Biochemistry—4 credits

A continuation of CHM 351, but more chemical in emphasis. Devoted primarily to metabolism and cellular regulation.

Prerequisite: CHM 351.

CHM 490 Research—2, 4, 6, or 8 credits

Laboratory and library practice in undergraduate research.
Prerequisite: Permission of the department.

CHM 514 Topics in Inorganic Chemistry—4 credits

Discussion of areas of current interest in inorganic chemistry.
Prerequisite: CHM 413.

CHM 543 Statistical Thermodynamics—4 credits

The statistical basis of thermodynamics; ensembles, partition functions, and distribution functions; classical and quantum statistical mechanics; applications to simple physical and chemical systems.
Prerequisites: CHM 245, PHY 152, MTH 254.

CHM 545 Quantum Chemistry—4 credits

The quantum mechanics of molecular energies and structure will be presented, and the interpretation of infra-red, Raman, nuclear magnetic resonance, electron spin resonance and other spectra will be discussed. Applications of spectroscopy to problems of molecular structure, intermolecular forces, and chemical reactions may be studied.
Prerequisite: CHM 444.

CHM 553 Genetic Biochemistry—4 credits

The biochemical basis of heredity; genetic and biochemical functions of DNA, RNA, and proteins; genetic control of cell biochemistry; biochemical genetics.
Prerequisite: CHM 452.

CHM 690 Research—2, 4, 6, 8, 10, or 12 credits

Graduate research and study under the supervision of a faculty member.
Prerequisite: Permission of the department.

SCHOOL OF EDUCATION

Laszlo J. Hetenyi, *Dean*
Roderic E. Righter, *Associate Dean*

TEACHING FACULTY

Department of Teacher Education

Professors:

Edward A. Bantel
Harry T. Hahn
Laszlo J. Hetenyi

Assistant Professors:

Harold C. Cafone
Kenneth R. Conklin
John H. Langer
Roderic E. Righter

Instructor:

F. James Clatworthy

College of Arts and Sciences

Professors:

Edward J. Heubel
G. Philip Johnson
Carmine Rocco Linsalata
William Schwab

Associate Professors:

Melvin Chernob
William C. Forbes
Donald C. Hildum
Jack R. Moeller
W. Patrick Strauss
S. Bernard Thomas
Irving Torgoff

Assistant Professors:

Peter G. Evarts
Don R. Iodice
David G. Lowy
Ross A. Norris

The School of Education at Oakland University is a genuinely interdisciplinary body. As the roster of the teaching faculty indicates, scholars from many departments contribute their talents to the education of teachers.

The College of Arts and Sciences and the School of Education jointly sponsor candidates for the Master of Arts in Teaching (M.A.T.) degree in a variety of disciplines for secondary teachers. Currently programs are available in English and mathematics, with additional programs (social science, French, history) projected for the future.

THE MASTER OF ARTS IN TEACHING

The School of Education sponsors candidates for the Master of Arts in Teaching (M.A.T.) degree in Elementary Education with concentrations in classroom teaching and in reading instruction. At some future date the school hopes to offer work in such fields as Special Education, Counseling and Guidance, and Administration, as well as in the preparation of School Diagnosticians. These degrees, however, are not yet available.

Degree requirements—General

Students who wish to enter any M.A.T. program must complete the application procedures for admission to graduate study (see page 12). Admission is selective and the School of Education will consider each applicant's case on its merits. After initial acceptance (admission to course), students are assigned a guidance committee and an adviser to assist in program planning. After completing 12 credits (normally three courses), the committee will evaluate the student's progress and plan the remainder of his program. A grade average of 3.0 or better is expected for academic good standing.

M.A.T. programs consist of 36 credits, of which four (4) are normally reserved for a terminal project. This project may, but need not, be a thesis. The student and his committee will work out the nature and scope of the project appropriate for each individual.

Degree Requirements—Secondary

In general, the bulk of each student's work will be in the discipline area of his major and such cognates as his major department prescribes, but each program will contain four (4) credits chosen from History of Education, Sociology of Education, Philosophy of Education, or Comparative Education; four (4) credits in either Developmental Psychology, or Tests and Measurements; and four (4) credits devoted to the problems of teaching the discipline of the major—this last course conducted by the major department.

Degree Requirements—Elementary

Although each student's program will be developed by his guidance committee, the patterns listed below should be regarded as typical examples. In planning the course of study the guidance committee will not only take into account the student's current needs and interests, but will attempt to strengthen or supplement those areas of undergraduate preparation where the student shows weakness or where new data have made further work desirable.

A typical program for the M.A.T. for General Classroom Teachers contains:

- I. Either:

Philosophy of Education	(4)
or	
History of Education	(4)
or	
Sociology of Education	(4)
or	
Comparative Education	(4)
	4 semester hours
- II. Developmental Psychology (4)
 Tests and Measurements (4)
 Curriculum Studies (if needed) (4)
 Terminal Project (4)
 12-16 semester hours
- III. Courses selected by the candidate and the guidance committee to produce a well-rounded program.
 16-20 semester hours

A characteristic program for the M.A.T. with a concentration in Reading Instruction might contain:

- I. Either:
 - Philosophy of Education (4)
 - or
 - History of Education (4)
 - or
 - Sociology of Education (4)
 - or
 - Comparative Education (4)

4 semester hours
 - II. Developmental Psychology (4)
 - (if needed)
 - Tests and Measurements (4)
 - Terminal Project (4)
 - Curriculum Studies (if needed) (4)
 - Individual testing (if needed)

12-16 semester hours
 - III. Diagnosis of Reading Disability (4)
 - Correction of Reading Disabilities (4)
 - Problems in Reading Instruction (4-8)
 - Current Trends in Reading Instruction (if needed) (4)

12-20 semester hours
 - IV. Courses selected by the candidate and the guidance committee to produce a well-rounded program.
- 0-8 semester hours

The School of Education reserves the right to expand these typical requirements in order to remove deficiencies from, or bring up-to-date, the preparation of degree aspirants.

The terminal project will be developed by the candidate and his guidance committee. Many types of projects may be approved. One student may decide to write a Master's essay. Another may wish to perform a controlled study on the effectiveness of different instructional techniques. A third may wish to try out an experimental unit, and a fourth may

propose the development of some teaching device of novel design. In some instances the student and the committee may decide that a special set of comprehensive or special field examinations might be appropriate. The latitude available to the committee and the student is extremely broad.

Certification

The M.A.T. degree programs are based on the assumption that students already hold (or are eligible for) the Michigan Provisional Certificate in the area of their specialization. Students who either hold no certificate or wish to change specialization must expect to engage in a longer period of study than is implied by the programs described. Usually, however, combining certification with an M.A.T. program will require a shorter sequence than obtaining certification and the Master's degree separately. Those seeking such a combined program should contact the School of Education for assistance in planning their course of study.

Course Offerings

ED 509 The School and the Disadvantaged Child—2 credits

A study of the difficulties and opportunities arising in the schooling of children from disadvantaged home environments. The course will concern itself with such topics as: clashes between values in school and home environments, communication across sub-cultural barriers, problems of motivation, etc. Prerequisite: Permission of the instructor.

ED 531 Current Trends in the Teaching of Reading—4 credits

An intensive examination of current instructional practices, problems, and research in the teaching of reading. Prevailing trends in reading instruction will be evaluated in light of cumulative research findings concerning the development of reading skills.

Prerequisite: Admission to course in any graduate program or permission of the department.

ED 532 Teaching Reading in the Primary Grades—4 credits

This course is designed to examine principles, practices and research related to early reading instruction. It will include an

analysis of the relationship of the various language arts to reading skills and place emphasis upon the developmental skills of pupils starting with kindergarten.

Prerequisite: Admission to course in any graduate program or permission of the department.

ED 533 Teaching Reading in the Upper Grades—4 credits

This course is designed to examine the principles, practices and research related to the teaching of reading in grades four and higher. Emphasis will be placed upon the developmental reading skills in a reading program geared to the individual needs of pupils. Particular emphasis will be placed upon reading in the content areas.

Prerequisite: Admission to course in any graduate program or permission of the department.

**ED 534 Language Arts Instruction in the Elementary School—
4 credits**

This course is designed to provide a scholarly examination of research findings, materials, and procedures for the development of spelling, composition, speaking, and listening skills in children. Discussions will center on those areas of the curriculum which directly influence language development and will demonstrate how the coordinated language arts approach and the use of literature appropriate to each age level can balance the growth of communication skills.

Prerequisite: ED 331 or 531 or equivalent preparation in reading instruction.

ED 590 Special Problems in Education—2-4-6-8 credits

A course dealing with specialized problems in various phases of education.

Depending on the clientele and staff needs, the specific topics may differ from term to term. The course may be taken more than once but for no more than a total of 8 credits.

Prerequisite: Admission to course in any graduate program or permission of the department.

ED 601 History of Education—4 credits

A study of the cultural forces (primarily in the West) as they shaped, and were shaped by, the education of the young.

Characteristic patterns of educational institutions, changing conceptions of curricula, dominant social and philosophic ideas concerning education, and significant contributions by individual educators represent some of the professional topics which are discussed in their historical settings.

Prerequisite: Admission to course in any graduate program.

ED 602 Philosophy of Education—4 credits

A study of philosophical inquiry in relation to education. Philosophic analysis of educational problems, educational conclusions by systematic philosophers, logical relationships between various philosophical and educational positions are among the topics considered.

Prerequisite: Admission to course in any graduate program.

ED 603 Comparative Education—4 credits

An analysis of education and its relationship to social and economic change in various cultures. Lectures, readings, and discussions will deal primarily with existing educational systems originating in Western culture, such as Great Britain, U.S.S.R., Sierra Leone, and Kenya, but the course will also include some study of selected utopian educational systems.

Prerequisite: Admission to course in any graduate program.

ED 611 Problems in Elementary Education—4-8 credits

A study of issues in the curriculum, methodology, organization, and administration of elementary schools. Student needs and preparation determine the specific topics included in a given semester. Students may register repeatedly for this course up to a total of eight (8) credits.

Prerequisite: Admission to course in a graduate program in Elementary Education.

ED 612 Curriculum Studies—4 credits

A study of curriculum theories and practices in light of modern educational research. The course will investigate the sum total of experiences provided for young people in school settings and will challenge established practices on the basis of recent curricular developments.

Prerequisite: Admission to course in a graduate program in Elementary Education.

ED 631 Problems in Reading Instruction—4-8 credits

A study of diagnostic, methodological, organizational, and administrative issues in reading programs. Student needs and preparation determine the specific topics included in a given semester. Students may register repeatedly for this course up to a total of eight (8) credits.

Prerequisites: Admission to course in a program in education and at least one previous course in reading instruction.

ED 632 Diagnosis of Reading Disabilities—4 credits

A laboratory course concerned with the analysis and study of factors which contribute to or precipitate reading disabilities in elementary and/or secondary school pupils. The course includes selection and administration of both informal and standardized tests and also deals with the preparation and evaluation of case reports.

Prerequisite: Admission to course in a graduate program in Elementary Education and at least one previous course in reading instruction.

ED 633 Correction of Reading Disabilities—4 credits

A laboratory course designed to focus attention on methods, materials, and practices pertaining to the instruction of disabled readers. The course provides opportunities to plan, organize, and conduct remedial instruction for children under the supervision of the instructor.

Prerequisites: Admission to course in a graduate program in education and at least one previous course in reading instruction.

ED 699 Terminal Project—4 credits

The planning and execution of a significant research or action project in accordance with the advice of the student's guidance committee.

Prerequisites: Admission to degree candidacy in a graduate program in elementary education and written approval of the student's guidance committee.

Certain courses offered by the Department of Psychology are of special interest to graduate students preparing for an M.A.T. degree (PSY 510, PSY 520, PSY 611). For descriptions of these courses see pp. 49-51.

Additional courses appropriate for many graduate students in M.A.T. programs are:

SCI 505 Basic Concepts and New Developments in Science—4 Credits

Basic concepts in science and science methodology. An intensive study of one science area (e.g. biology, chemistry, physics, etc.), and a study of the new curricula in science for the elementary school.

Prerequisite: Admission to course in a graduate program in Elementary Education, or permission of the instructor.

SOC 565 Sociology of Education—4 credits

The structure of educational institutions in the U.S. as compared with other societies. The teacher role in American society. The peer group and its contact with administration and teacher. The drop-out, the first generation college graduate.

Prerequisite: Permission of the instructor.

SS 570 Social Studies in the Elementary School—4 credits

An intensive study of current trends, challenges, characteristics, and content of effective social studies programs, with emphasis on the relationship among discipline areas comprising the social studies. The course will stress application of these studies in urban area elementary schools.

Prerequisites: Education 245 and acceptance into a graduate or certification program or major standing in Elementary Education.

SCHOOL OF ENGINEERING

John E. Gibson, *Dean*

Richard R. Shank, *Associate Dean*

Professors:

John E. Gibson

William G. Hammerle

Associate Professors:

Robert H. Edgerton

J. Carroll Hill

Keith R. Kleckner

Richard R. Shank

Howard R. Witt

Assistant Professors:

David E. Boddy

Richard E. Haskell

Glenn A. Jackson

Gilbert L. Wedekind

THE MASTER OF SCIENCE IN SYSTEMS ENGINEERING

The School of Engineering offers work leading to the Master of Science degree in Systems Engineering. Courses in automatic control, communication systems, and large-scale systems, along with appropriate work in other areas such as mathematics and physics, are offered. Programs ordinarily do not require a thesis, but rather emphasis is placed on a system design effort carried out individually or in a small group. The object of the Master of Science program is to provide participants with a broad training in systems engineering rather than a narrow apprenticeship in a specific research area, which is perhaps more appropriately delayed for doctoral thesis preparation.

Courses are arranged in the late afternoon and early morning for the convenience of students who are employed in nearby industry. Such part-time students should be aware, however, of the very real burden placed on them by graduate studies and should arrange to keep their outside work commitments within reasonable bounds.

Graduate teaching assistantships and research assistantships are available on a competitive basis. The stipend for two semesters is \$2400 and the holder is permitted to register for as many as eight credits. Renewal of the assistantship is contingent on satisfactory progress toward the degree.

Oakland University is on the trimester plan and a full-time student (three four-credit courses per fifteen-week semester) can complete the course requirements for the Master's degree in eleven calendar months.

Acceptance Into Degree Candidacy

Admission to graduate work in engineering is selective. A student should present a Bachelor's degree in science or engineering. A degree in physics, mathematics, or any recognized field of engineering is acceptable. Any other field of science is also acceptable but a student presenting such a degree will probably be required to expend extra effort to become proficient in the fundamentals of engineering. No formal requirements are imposed upon such a person. He will be advised concerning correction of deficiencies and may be admitted on probation.

Recommendations from two members of his undergraduate department on his suitability for graduate study are to be submitted by each candidate for admission to the M.S. program. Upper-quartile rating in one's graduating class as well as interest and aptitude are typical requirements for admission.

Requirements for the Degree

A typical M.S. program in Systems Engineering consists of an 8-credit minor in mathematics, a second 8-credit minor either concentrated or distributed, and a 20-credit major in Engineering. (Most courses carry four credits.)

A term project or M.S. thesis is required of all students who expect to seek a recommendation for admission to a Ph.D. program. This independent investigation forms an important part of the recommendation made by the engineering faculty regarding further graduate work.

The Master of Science in Systems Engineering: a typical program.

Semester 1:	EGR 520 ANALYSIS AND SYNTHESIS OF LINEAR CONTROL SYSTEMS	(4 credits)
	MTH 531 GRADUATE ENGINEERING MATHEMATICS I	(4 credits)
	SECOND MINOR	(4 credits)
		12 credits
Semester 2:	EGR 521 MODERN TOPICS IN CONTROL ENGINEERING	(4 credits)
	MTH 532 GRADUATE ENGINEERING MATHEMATICS II	(4 credits)
	SECOND MINOR	(4 credits)
		12 credits
Semester 3:	EGR 530 INTRODUCTION TO RANDOM SIGNALS AND SYSTEMS	(4 credits)
	EGR 535 LARGE SCALE SYSTEMS	(4 credits)
	EGR 505 ENGINEERING DESIGN PROJECT	(4 credits)
		12 credits

The first minor in mathematics is strongly advised. The second minor may be taken in another area of engineering or in an allied science such as biology or physics or another area with the approval of the faculty adviser.

Course Descriptions

EGR 520 Analysis and Synthesis of Linear Control Systems—4 credits

Review of elementary frequency and time domain methods, error analysis, sensitivity of poles, multivariables, state variable formulation; application of these methods to problems of vehicle dynamics, process control, and discrete systems. Analog and digital computation used extensively.

EGR 521 Modern Topics in Control Engineering—4 credits

Some topics in nonlinear systems including phase plane, describing function, analytical methods and stability; optimal control; learning and adaptive systems.

EGR 530 Introduction to Random Signals and Systems—4 credits

An introduction to the analysis and design of control and communication systems which process random signals. Probability and the description of random signals, correlation functions, power spectra, filtering, and an introduction to detection theory.

EGR 535 Large Scale Systems—4 credits

System management, PERT, CPM, operations research, simulation, man-machine interface problems, game theory, queuing theory, traffic control. Each term a specific system study will be conducted in an area such as a life support system for a moon colony, saline water conservation, a specific mass transportation method, etc. A major emphasis in the course will be on the preparation of the project report.

EGR 505 Engineering Design Project—4 credits

A project requiring independent design effort by student. Theoretical studies followed by hardware realization will be encouraged. Laboratory and computer studies will be included. Emphasis will be placed on completing project properly within time limits and on preparation of final report. No text.

MTH 531 Graduate Engineering Mathematics I—4 credits

Linear algebra and infinite series, with applications to the solution of systems or ordinary differential equations. Prerequisite: Graduate standing.

MTH 532 Graduate Engineering Mathematics II—4 credits

Functions of several variables, vector field theory, and partial differential equations. Prerequisite: Graduate Engineering Mathematics I.

EGR 540 Electromagnetic Signals and Waves—4 credits

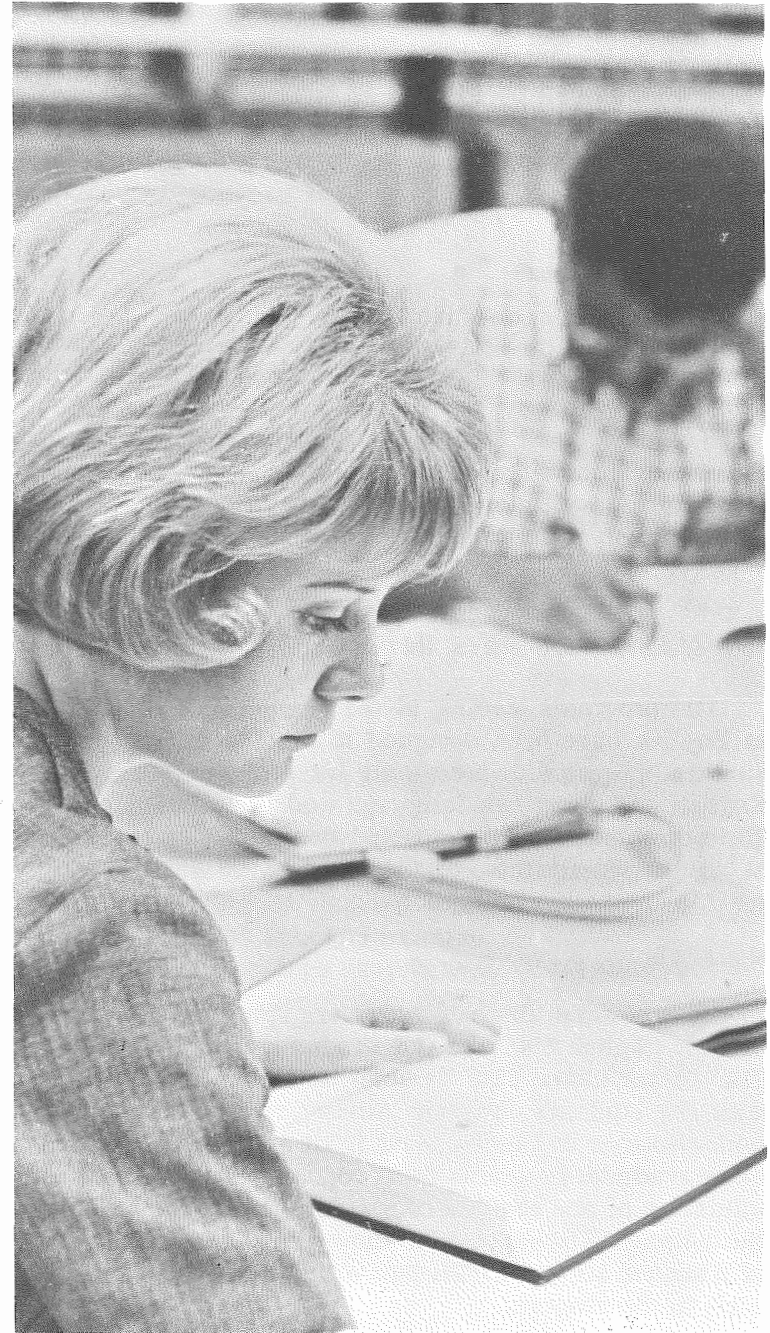
An introduction to the propagation of electromagnetic signals in free space and material media; Maxwell's equations; radi-

ation; geometrical optics; introduction to information transmission and signal processing.

EGR 550 Seminar in Coherent Optics—4 credits

A seminar on current developments in the field of coherent optics; theory and application of laser sources; recent advances in holography; use of coherent optics in data processing and communication systems; seminar includes laboratory work and demonstrations.

Prerequisite: EGR 540 Electromagnetic Signals and Waves or permission of the instructor.



DEPARTMENT OF ENGLISH

Professors:

Robert Hoopes, *Chairman*
Thomas Fitzsimmons (on leave 1967-68)
William Schwab
Gertrude M. White

Associate Professors:

John G. Blair (on leave 1967-68)
Maurice F. Brown (on leave 1967-68)
Joseph W. DeMent
Richard S. Lyons

Assistant Professors:

Peter G. Evarts
Donald E. Morse
Marilyn L. Williamson

THE MASTER OF ARTS IN ENGLISH

The programs leading to the degree of Master of Arts in English have been designed to provide training for the student interested in increasing his proficiency in areas of English and American language and literature. Upon program completion, candidates may continue work to the Ph.D. at another institution, or find the degree work useful in teaching and other professional activity.

Requirements for the Degree

Nine courses, three of which are specified: English 680 or 681, English 690, and one graduate seminar in English. The six additional courses shall be chosen in consultation with the student's Program Adviser from additional graduate offerings in English, and from appropriate courses in other graduate programs or in cognate liberal arts fields. A minimum of one cognate course is required. Candidates for the degree will be expected to show proficiency in the reading of a second language (ancient or modern) by examination early in the program.

THE MASTER OF ARTS IN THE TEACHING OF ENGLISH

The program leading to the degree of Master of Arts in the Teaching of English has been designed for students who wish to pursue graduate study to improve their competence as teachers of English and American literature and language. It is sponsored jointly by the Department of English and the School of Education.

Requirements for the Degree

Nine courses, six of which are specified: one graduate seminar in English, English 510, English 680 or 681, English 690, one course in the history, philosophy, or sociology of education or in comparative education, and one course in developmental psychology or in tests and measurements. The remaining three courses shall be chosen in consultation with the student's Program Adviser from graduate offerings in English (limit: twelve additional hours), courses in cognate liberal arts fields (limit: eight hours), and graduate courses in education (limit: four additional hours).

TYPICAL PROGRAMS

The Master of Arts in English (a typical program)

- Semester 1: ENG 680 or 681: Independent Reading
Any 500 level ENG course: period, author, topic, or language course
English or cognate course
(Language examination passed and acceptance to degree candidacy)
- Semester 2: Any 500 level ENG course: period, author, topic or language course
Cognate course or English
Any 600 level ENG course: Seminar
(Project proposal accepted)
- Semester 3: English or cognate course
Cognate course
ENG 690: The Master's Project

The Master of Arts in the Teaching of English
(a typical program)*

- Semester 1: ENG 510: Literature and Composition
ENG 680 or 681: Independent Reading
Any 600 level ED course or any 500 level PSY course: See degree requirements
(Acceptance to degree candidacy)
- Semester 2: Any 500 level ENG course: period, author, topic, or language course
Any 500 level PSY course or any 600 level ED course: See degree requirements
Any 600 level ENG course: Seminar
(Project proposal accepted)
- Semester 3: Cognate course or English
Cognate course or Education
ENG 690: The Master's Project

GRADUATE COURSE OFFERINGS

Courses in English. Departmental offerings are listed below. All courses offer four semester hours of credit, unless otherwise stated. Some of the courses numbered in the 500-range are joint courses, offered to graduate students and undergraduate English majors. They are usually lecture and recitation courses enrolling from 30-50 students. A second group of 500 courses are conference courses, offered to graduate students only and numbering up to 30 students. All 500 courses offered in the Summer School are of this nature. Seminar courses, listed in the 600-range and limited to 12 students, are intensive courses, requiring initiative and individual work of a scholarly nature. Course offerings in each semester will vary considerably, and the student should consult a schedule of classes.

English 680 and 681 are independent reading courses, in which the student is asked to assess his strengths and weaknesses at the beginning of graduate study and to identify

*Bachelors of Arts with major in English, applying for the M.A.T. in English and Certification, would take ED 428: *Teaching of the Major Field*, and ED 455: *Internship (8 hours)*, in a fourth semester. The Graduate Programs Committee may require other undergraduate courses in education when appropriate.

areas of literature, literary history or critical methodology in which he wishes or needs to read. The courses provide a general introduction to graduate study, to the library, and to problems of research and bibliography.

English 690 involves completion of a modest project of creative, scholarly, or pedagogical nature, proposed by the degree candidate toward the end of his program. Any written work to be submitted in partial or total fulfillment of a project should not exceed a limit of 7500 words. Upon acceptance of a proposal, the Graduate Programs Committee will appoint a faculty member to supervise and evaluate the project. A form for application to enter English 690 is available in the Departmental Office.

Courses in Other Professional and Liberal Arts Areas. Beyond the eight hours required in graduate work in education and psychology for the M.A.T. degree, candidates for both degrees who are adequately prepared in English are urged to take work in graduate programs other than English or in advanced courses offered to majors in cognate liberal arts fields. Such course work should be advanced work in a field of some competence, or exploration of relevant but relatively unknown territory. At least one cognate course is required in the M.A. program.

ENG 500 Advanced Topics in Literature and Language

Special topics and problems as selected by the instructor. May be taken for credit more than once, provided the topic is not repeated. Conference Course.

ENG 507 Contemporary Drama

Representative plays of major contemporary writers from Ibsen to Albee. Conference Course.

ENG 510 Literature and Composition

Form and style in prose and poetry. Exploration of relationships among the study of literature, the study of language, and composition. Experience in writing and the criticism of writing. Designed for the teacher of English language and literature.

ENG 512 Myth and Literature

The principal Greek and Roman myths and their uses in classical and postclassical art and literature.

ENG 525 Melville

Intensive study of Melville's works with emphasis on prose fiction, especially *Moby Dick*. Scrutiny of critical clichés about Melville. Conference Course.

ENG 530 Henry James

The novels, shorter fiction and literary criticism of Henry James. The course will include work in biographical and critical approaches.

ENG 540 American Writing Now

American fiction, poetry and drama.

ENG 551 Chaucer

The major works, with emphasis on *The Canterbury Tales* and *Troilus and Criseyde*.

ENG 555 Literature of the English Renaissance

Selected poetry and prose, non-dramatic and dramatic, exclusive of Shakespeare; the Renaissance (roughly 1550-1660) as a historical and cultural phenomenon.

ENG 560 Metaphysical Poetry

Study of the poetry of Donne, Herbert, Crashaw, Vaughan, and Traherne.

ENG 565 Shakespeare

Intensive analysis of four or five of the plays, textual and dramatic criticism, sources, and Shakespeare in the theater.

ENG 566 Milton

Selected early poems, including "On the Morning of Christ's Nativity," "Comus," "Lycidas"; some of the sonnets and prose treatises; *Paradise Lost*, *Paradise Regained*, and *Samson Agonistes*.

ENG 570 The Romantic Period

Poets of the Romantic Period—Wordsworth, Coleridge, Scott, Byron, Shelley, Keats—with some attention to the pre-Romantics, Burns and Blake. Their poetry and its relation to the intellectual currents of the time.

ENG 571 Victorian Literature

A selection of fiction, prose, and poetry of the middle and late nineteenth century. Representative authors include Dickens, Thackeray, Meredith, Tennyson, Browning, and Arnold.

ENG 575 Modern Literature

Modern British, American and/or Continental literature, with special concentration on the work and development of a single writer.

ENG 577 Modern English Grammar

A survey of English structure, especially of syntax, with descriptions based on the work of important contemporary scholars.

ENG 583 Transformational Grammar

The goals of generative-transformational theory; detailed analysis of the generative-transformational model; pedagogical applications. Conference Course.

ENG 590 Literary Criticism

Problems in the analysis of literature and practical difficulties in evaluating individual works. Readings in important modern and earlier schools of criticism, together with relevant works of literature. Enrollment limited.

ENG 621 Seminar: American Transcendentalists

Criticism and research in selected topics in the work of Emerson, Thoreau, Parker, Fuller, Brownson, Alcott, and others. Permission of the instructor.

ENG 635 Seminar: The American Novel

A concentrated examination of the work of a novelist or of a topic in American fiction, as selected by the instructor. (Topic for 1967: Faulkner)

ENG 657 Seminar: English Drama to 1590

Medieval liturgical drama and its sources. Craft cycles, moralities, farces. School plays, inns of court plays, the court drama. Early English comedies and tragedies. Plays of Shakespeare's immediate predecessors, especially Marlowe. Permission of instructor.

ENG 660 Seminar: Humanism and Science, 1600-1660

Experience, reason, and authority in the late Renaissance. Anti-scholasticism, anti-Ciceronianism, and mutations of melancholy in Hooker, Bacon, Chapman, Donne, Burton, Browne, Descartes, Hobbes, the Cambridge Platonists, and Milton. Permission of instructor.

ENG 665 Seminar: Eighteenth Century Studies

Consideration of specific writers and issues of the Restoration and eighteenth century. (Topic for 1966: Dryden and Pope)

ENG 670 Seminar: The Nineteenth-Century English Novel

Intensive reading and discussion of selected masterpieces of fiction and independent work on a topic in the area. Permission of instructor.

ENG 680 Independent Reading I

Independent reading in English literature from the beginning to 1800. Reading is selected by student, in conference with instructor. Attention given to problems of bibliography and literary scholarship.

ENG 681 Independent Reading II

Independent reading in English literature from 1700 to the present, and in American literature. A companion course to English 680, it may be taken independently.

ENG 690 The Master's Project

Completion of a modest project of creative, scholarly, or pedagogical nature proposed by the degree candidate. Permission of Graduate Programs Committee (and of the School of Education for MAT candidates).

DEPARTMENT OF MATHEMATICS

Professors:

G. Philip Johnson, *Chairman*
Louis R. Bragg
John W. Dettman
James McKay

Associate Professors:

Harvey J. Arnold
Donald G. Malm
Harvey A. Smith
Beauregard Stubblefield

Assistant Professors:

Robert C. Busby
Nguyen Phuong Cac
Jon Froemke

Instructors:

Thomas M. Jenkins
C. Peter Lawes

THE MASTER OF ARTS IN MATHEMATICS

The curriculum for students seeking the M.A. degree in mathematics is designed primarily to be the first part of a Ph.D. program. While some students may elect to proceed directly from their degree work to teaching, government, or industrial jobs, the majority will transfer to other universities to continue work for the Ph.D. A normally prepared and progressing student should be able to satisfy all the requirements and take his M.A. in three semesters (one calendar year), taking three four-credit courses each semester. Because the enrollment is small, students can expect to receive a good deal of individual attention and encouragement from the faculty.

Applicants for the program should have strong undergraduate backgrounds in mathematics. It is highly desirable that their work include two semester courses in elementary real variable theory, a course in linear algebra, and a course in modern algebra. A course in general topology is also desirable. Students with deficiencies in these areas will be

asked to register for courses to correct the deficiencies, and it is likely that their degree programs will take somewhat longer than one year to complete.

Teaching assistantships are available in the program. Each carries a stipend of \$2400 for two semesters, in compensation for about six hours a week of recitation supervision in calculus and other elementary courses. Additional support for the third semester is available on a selective basis. It is common for assistants to proceed on their degree work at the standard rate and thus to satisfy all requirements within one year.

The bulk of the courses taken in the program is drawn from the following list.

MTH 551-552 Real Analysis—8 credits

The general theory of measure and integration including development of the Lebesgue integral, the classical Banach spaces and elements of functional analysis.

MTH 555-556 Complex Analysis—8 credits

Analytic functions, Cauchy's theorem, representation theorems, analytic continuation, Riemann surfaces, and conformal mapping.

MTH 561-562 Topology—8 credits

Homotopy theory and, at the discretion of the instructor, either such topics in algebraic topology as homotopy groups and cohomology theory or advanced topics in point-set topology.

MTH 565 Topological Algebraic Structures—4 credits

A brief survey of topological groups, vector spaces, and algebras followed by detailed study of one or more special cases, such as locally compact groups, Lie groups, Banach spaces or Banach algebras.

MTH 571-572 Algebra—8 credits

Group theory, rings and modules, linear and multilinear algebra, and field extensions. Emphasis is placed, where possible, on categorical properties and functorial relationships.

Other courses will be added to this list as the need for them arises, and nominally senior-level courses can also be taken for graduate credit in limited number. Reading and research for credit is done under the course title MTH 590, Directed Research. A total of 36 credits is required for the degree and, of these, at least 4 must come from MTH 590. With the staff expected for 1967-68, students can satisfy their reading and research requirements in point-set topology, algebraic topology, group theory, functional analysis, differential equations, complex analysis, probability and statistics, graph theory, and applied mathematics. There is necessarily some variation in the curricula undertaken by candidates, but the following is representative.

Fall Semester—MTH 551, MTH 555, MTH 571

Winter Semester—MTH 552, MTH 561, MTH 572

Spring Semester—MTH 562, MTH 565, MTH 590

Each student's program is supervised by a committee of three department members. The committee is charged with passing on the acceptability of the student's performance and with setting a comprehensive examination for him near the end of the program.

THE MASTER OF ARTS IN TEACHING DEGREE IN MATHEMATICS

The primary purpose of this program is to provide a Level IV preparation in mathematics as recommended by the Committee on the Undergraduate Program in Mathematics of the Mathematical Association of America. Students in the program have the opportunity to increase significantly their knowledge of mathematics and its teaching, and graduates are qualified for teaching advanced placement courses in high school (calculus, linear algebra, probability, etc.) or for teaching at the freshman or sophomore level in college.

It is a normal practice for students to pursue their M.A.T. work on a part-time basis; during each of the fall and winter semesters they take a single course which meets late in the

afternoon to afford minimum disruption to the schedules of those who are engaged in high school teaching. Participation during the eight-week summer session, on the other hand, is usually full-time. On this basis the degree requirements can be satisfied in a little less than two and one-half years.

A background of at least 30 semester credits in undergraduate mathematics is required of applicants.

The requirements for the M.A.T. degree consist of 36 credits of graduate work. Normally a candidate will complete seven four-credit courses in mathematics and two in education or psychology. Among his mathematics credits he must include at least 4 credits in independent reading, and he must present to the mathematics department a critical essay based on his reading. A committee of three faculty members will supervise his program and judge the merits of his essay and his overall performance.

The mathematics courses offered for the program include sequences in algebra and analysis, which provide the core of most students' degree work. These sequences are the following.

MTH 514-515 Concepts in Modern Algebra—8 credits

Includes topics from groups, rings, fields, matrices, linear transformations, and vector spaces.

MTH 517-518 Concepts in Analysis—8 credits

Includes a study of real and complex numbers, functions, limits, differentiation, integration, and infinite series with emphasis on careful proofs of theorems.

Other mathematics courses can be taken from the department's offering at the senior and graduate levels. When such courses are given during the summer session, they are likely to be modified to meet special interests of M.A.T. candidates. Independent reading is done under the course title MTH 590, Directed Research. Schedules for degree work will vary considerably, but the following is typical

for a part-time student who is not seeking teaching certification.

Fall Semester, 1st year	MTH 514	
Winter Semester, 1st year	MTH 515	
Summer Session, 1st year	MTH 425	(Probability)
	ED 602	(Philosophy of Education)
Fall Semester, 2nd year	MTH 517	
Winter Semester, 2nd year	MTH 518	
Summer Session, 2nd year	MTH 416	(Concepts in Geometry)
	PSY 520	(Tests and Measurements)
Fall Semester, 3rd year	MTH 590	

DEPARTMENT OF PHYSICS

Professors:

Ralph C. Mobley, *Chairman*
Robert M. Williamson

Associate Professor:

John M. McKinley

Assistant Professors:

Paul A. Tipler
Libor J. Velinsky
Marshall J. Sheinblatt

Instructor:

Bruce R. Danner

THE MASTER OF SCIENCE IN PHYSICS

Work toward the Physics Master's degree consists of courses, research, seminar participation and a final research report or critical essay. Formal thesis is not required. Students receiving the degree will be prepared to do work toward the Ph.D. degree in physics, to teach at the junior college or secondary school level, or to work in industry.

The average candidate entering in the fall semester will usually require two academic years to complete the degree. A very well-prepared candidate could complete the required courses and research credits in three trimesters of one calendar year. Each graduate student's program will be adjusted to his interests and background. PHY 673, research, and a seminar are the only fixed course requirements.

Admission Requirements

Applicants should have a bachelor's degree from an accredited institution or proof of equivalent achievement. The graduate record examination may be accepted in lieu of a formal degree. The applicant's background should be strong in physics and mathematics.

Degree Requirements

Thirty-six semester hours of credit distributed as follows:

1. 4 credits of Phy 673 Quantum Mechanics.
2. 22 credits of 400, 500 or 600 level courses approved by the Physics Department.
3. 8 credits of research, including a final written report or critical essay.
4. 2 credits of seminar.

Course Offerings

A. SELECTED 400 LEVEL COURSES WHICH MAY CARRY GRADUATE CREDIT:

PHY 417-418 Advanced Laboratory—4 credits

Methods of experimental physics. Experiments and projects in all areas of classical and modern physics, with emphasis on research techniques and detailed analysis of experimental data.

Prerequisites: PHY 317-318, 341, 347-348, or equivalent.

Pre-or Corequisites: PHY 331, 361, 371, or equivalent.

PHY 421 Thermodynamics—4 credits

The zeroth, first and second laws of thermodynamics with applications to pure substances. Introduction to the kinetic theory of gases and to statistical mechanics.

Prerequisites: PHY 151, MTH 258, or equivalent.

PHY 472 Quantum Mechanics I.—4 credits

Principles of nonrelativistic quantum mechanics. Schrödinger wave equation, expectation values of energy, position, momentum and angular momentum operators, spin, perturbation theory, and identical particles with applications to atomic systems.

PHY 482 Electricity and Magnetism II.—4 credits

Multipole fields, solutions of Laplace and Poisson equations, electromagnetic waves in insulators and conductors, the derivation of the laws of optics from Maxwell's equations.

Prerequisites: PHY 381, MTH 259, or equivalent.

B. GRADUATE COURSES:

PHY 542 Advanced Electronics—4 credits

Selected topics of the analysis and design of electronic circuits.
Prerequisite: PHY 341 or equivalent.

PHP 548 Advanced Electronics Laboratory—2 Credits

Prerequisite: PHY 348 or equivalent.

PHY 562 Mechanics II.—4 credits

Methods of Lagrange and Hamilton, tensor algebra, rigid bodies in three dimensions, continuous media, and coupled systems.
Prerequisites: PHY 361, MTH 259, or equivalent.

PHY 573 Nuclear Physics—4 credits

The properties of ground and excited states of nuclei, nuclear reactions, fundamental particles, nuclear forces, interaction of particles and photons with matter, and nuclear particle detectors.
Prerequisite: PHY 472 or equivalent.

PHY 574 Introduction to Solid State Physics—4 credits

An introduction to the thermal, electrical, and magnetic properties of solids, which includes periodic structure, lattice dynamics, electron interactions and behavior, transport properties, Fermi surface, optical behavior, and superconductivity.

PHY 600 Seminar—1 credit

PHY 673 Quantum Mechanics II.—4 credits

Review of Schrödinger wave mechanics, formal algebraic approach to quantum mechanics, approximation methods, elastic scattering.
Prerequisites: PHY 472, PHY 562, or equivalent.

PHY 674 Quantum Mechanics III.—4 credits

Continuation of Physics 673. Angular momentum, identical particles, formal scattering theory, relativistic wave equations, quantization of radiation.
Prerequisite: PHY 673.

PHY 690 Research—2 to 12 credits

DEPARTMENT OF PSYCHOLOGY

Professors:

Harvey Burdick, *Chairman*
Donald D. O'Dowd

Associate Professors:

Donald C. Hildum
Irving Torgoff

Assistant Professors:

Kenneth H. Coffman
Richard A. Kammann
Aharon Kuperman
David G. Lowy
L. Crocker Peoples
David W. Shantz
Richard L. Sprott

Visiting Assistant Professor:

Max Brill

Instructor:

Ralph J. Schillace

THE MASTER OF ARTS IN PSYCHOLOGY

The primary purposes of the program leading to the degree of Master of Arts in Psychology are to train students at the intermediate professional level and to initiate the student into advanced scholarship in preparation for additional graduate study at another institution. The areas in which a student may concentrate are psychological testing, school psychology, junior college teaching, developmental psychology, and general social psychology.

Requirements for the Degree

The primary prerequisites are academic ability and interest in advanced study in psychology. Applicants are expected to present evidence of superior academic aptitude. While an undergraduate major in psychology is not required, students are expected to be acquainted with the field. Those who are not may be asked to take a core undergraduate curriculum as a prerequisite for admission to the program.

The Master of Arts in Psychology: a typical program in Psychological Testing.

PSY 610 and 611 Pro-Seminar I and II
PSY 530 Advanced Abnormal
PSY 620 Individual Testing
PSY 621 Projective Tests
PSY 630 Clinical Psychology
PSY 680 and 681 Practicum I and II

GRADUATE COURSE OFFERINGS

PSY 510 Developmental Psychology—4 credits

Description and evaluation of the principles and theories of development from birth to maturity. Maturation processes, learning, and emotional disturbances will be some of the issues considered.

Prerequisite: Permission of the instructor or acceptance into graduate program.

PSY 520 Tests and Measurement—4 credits

Theories of measurement and evaluation. Construction and examination of tests of ability, achievement, interests, and special aptitudes. Objective tests of personality.

Prerequisites: Four courses in psychology including PSY 353 and 361, or acceptance into graduate program.

PSY 530 Advanced Abnormal—4 credits

Review of the major neurotic, psychotic, psychosomatic, and organic syndromes. Current issues and research in psychopathology.

Prerequisites: PSY 251 and permission of instructor or acceptance into graduate program.

PSY 540 Behavior Theory and Learning—4 credits

Conditioning, reinforcement, punishment, drives and transfer of training will be studied in their relationship to such complex human behavior as education, psychotherapy and the development of motives.

Prerequisite: Five courses in psychology including PSY 351, 353 and 361 or acceptance into Master's program.

PSY 595 Special Topics—4 credits

Exploration of current findings and theory in an area of special interest.

Prerequisite: Four courses in psychology and permission of instructor.

PSY 610 Pro-Semester I—4 credits

Designed for Master's candidates. Review and exploration of current research in personality and learning. (Offered only in the fall semester)

Prerequisite: Acceptance into Master's program.

PSY 611 Pro-Semester II—4 credits

Designed for Master's candidates. Experimental design and review of theories and research in social psychology. (Offered only in the winter semester)

Prerequisite: Acceptance into Master's program.

PSY 620 Individual Testing—4 credits

Designed for Master's candidates. Theory of intelligence testing. Administration and interpretation of Stanford-Binet and Wechsler tests.

Prerequisite: Acceptance into Master's program.

PSY 621 Projective Tests—4 credits

Designed for Master's candidates. Theory, demonstration and practical training in the use of projective techniques with special emphasis on Rorschach and the Thematic Apperception Test.

Prerequisite: Acceptance into Master's program.

PSY 630 Clinical Psychology—4 credits

The nature and scope of clinical psychology and the role of the clinician. Assessment and behavior modification will be emphasized.

Prerequisite: Acceptance into Master's program.

PSY 680 Practicum I—4 credits

Practical experience in the student's area of specialized technical training. May be in one of the following settings: schools, state hospital, courts, psychological service center,

social work agency, college teaching, etc. (Approximately 200 hours)

Prerequisite: Admission to candidacy in the Master's program.

PSY 681 Practicum II—4 credits

Continuation of Practicum I at a more advanced level. (Approximately 200 hours)

Prerequisite: PSY 680

PSY 690 Research Thesis—4 credits

Individual research project related to the student's area of concentration.

Prerequisite: Admission to candidacy in the Master's program.

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