

Oakland University

Graduate Study Catalog

1974-1976

Volume I

College of Arts and Sciences
School of Economics and Management
School of Engineering

OFFICE OF GRADUATE STUDY
OAKLAND UNIVERSITY
ROCHESTER, MICHIGAN 48063

CORRESPONDENCE DIRECTORY

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Rochester, Michigan 48063.

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See Volume II for
School of Education

Oakland University affirms that an Assurance of Compliance with Title VI of the Civil Rights Act of 1964 has been executed and is fully applicable to the policies and practices of this University. Specifically, admission to the University or employment by the University is provided to qualified persons without discrimination on the grounds of race, creed, color, sex, or national origin.

All announcements in this catalog are subject to revision at the discretion of the University.

June, 1974

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UNIVERSITY CALENDAR

1974 - 1975

FALL SEMESTER

August 29, 30	Thursday, Friday	Registration
September 3	Tuesday	Classes begin
October 21	Monday	Begin Advance Registration for Winter Semester
November 28- December 1	Thursday-Sunday	Thanksgiving Recess
December 2	Monday	Classes resume
December 11	Wednesday	Classes end
December 12-13, 16-18	Thursday, Friday Monday-Wednesday	Final Examinations

WINTER SEMESTER

January 2, 3	Thursday, Friday	Registration
January 6	Monday	Classes begin
March 8-11	Saturday-Tuesday	Winter Recess
March 12	Wednesday	Classes resume
March 24	Monday	Begin Advance Registration for Fall, 1975
April 15	Tuesday	Classes end
April 16-18, 21, 22	Wednesday-Friday, Monday, Tuesday	Final Examinations

SPRING SESSION

April 7-18	Thursday, Friday	Advance Registration
April 24, 25	Monday	Registration
April 28	Monday	Classes begin
May 26	Monday	Holiday
June 1*	Sunday	Commencement
June 19	Thursday	Classes end
June 20, 21	Friday, Saturday	Final Examinations

SUMMER SESSION

June 16-20		Advance Registration
June 23	Monday	Registration
June 24	Tuesday	Classes begin
July 4	Friday	Holiday
August 13	Wednesday	Classes end
August 14-15	Thursday, Friday	Final Examinations

This calendar is subject to revision.

*All students who have received or expect to receive their degrees during this academic year participate in this Commencement ceremony.

TENTATIVE UNIVERSITY CALENDAR

1975 - 1976

FALL SEMESTER

August 28, 29	Thursday, Friday	Registration
September 2	Tuesday	Classes begin
November 27-30	Thursday-Sunday	Thanksgiving recess
December 1	Monday	Classes resume
December 12	Friday	Classes end
December 15-19	Monday-Friday	Final examinations

WINTER SEMESTER

January 5, 6	Monday, Tuesday	Registration
January 7	Wednesday	Classes begin
March 11-14	Thursday-Sunday	Winter recess
March 15	Monday	Classes resume
April 16	Friday	End of Classes
April 19-23	Monday-Friday	Final examinations

SPRING SESSION

April 26, 27	Monday, Tuesday	Registration
April 28	Wednesday	Classes begin
May 31	Monday	Holiday
June 1	Tuesday	Classes resume
June 5*	Saturday	Commencement
June 18	Friday	End of classes
June 21, 22	Monday, Tuesday	Final examinations

SUMMER SESSION

June 23	Wednesday	Registration
June 24	Thursday	Classes begin
July 5	Monday	Holiday
July 6	Tuesday	Classes resume
August 13	Friday	End of classes
August 17, 18	Monday, Tuesday	Final examinations

This calendar is subject to revision.

*All students who have received or expect to receive their degrees during this academic year participate in this Commencement ceremony.

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W. Donald Wallace	Associate Professor of Physics
Gilbert L. Wedekind	Associate Professor of Engineering
Gertrude M. White	Professor of English

OAKLAND UNIVERSITY

ACADEMIC STRUCTURE

Oakland University, an institution supported by the State of Michigan, offers programs in liberal arts and sciences and professional training in economics and management, engineering, teacher education, and the performing arts. The University comprises the College of Arts and Sciences, the School of Economics and Management, the School of Education, the School of Engineering, the School of Performing Arts, and the Faculty of the Library. Diversified non-credit courses are given by the Division of Continuing Education.

GRADUATE PROGRAMS

The graduate catalog is published in two volumes. The programs offered by the College of Arts and Sciences, the School of Economics and Management and the School of Engineering are described in Volume I while those offered by the School of Education are described in Volume II. University requirements and general information appear in both volumes. The College of Arts and Sciences offers programs leading to the degree of Master of Arts in area studies, English, history, mathematics, and psychology and to the degree of Master of Science in biology, chemistry and physics. The School of Education offers programs of instruction leading to the degree of Master of Arts in guidance and counseling, and to the degree of Master of Arts in Teaching in early childhood education, in elementary education, in reading instruction and in special education. The College of Arts and Sciences and the School of Education jointly offer programs leading to the degree of Master of Arts in Teaching in English and in mathematics. The School of Engineering offers the Doctor of Philosophy degree in systems engineering, a professional development degree and the degree of Master of Science in engineering, with concentrations in systems engineering, energy engineering, and electromagnetic and optical engineering. The School of Economics and Management offers the degree of Master of Science in management. Additional programs at both the master's and doctoral levels are in prospect.

In each of the programs the University seeks to provide its students with intellectual challenge and opportunity for scholarly and professional growth. Its substantial resources in faculty, research facilities and support functions are all directed to these ends. A graduate program should not be solely a collection of courses and certainly should not be such if the courses are only casually related to each other. Rather it should be a carefully structured combination of studies and research designed in the aggregate to serve specific needs of the student. Students share with their advisers responsibility for constructing programs of study manifesting this character. They can expect close attention from the faculty while planning their studies and while pursuing them. In turn they should ask of themselves wholehearted commitment to the programs' demands.

ACCREDITATION AND AFFILIATIONS

All Oakland University baccalaureate and master's degree programs are fully accredited by the North Central Association of Colleges and Secondary Schools, and the University is authorized to begin new programs at these levels without prior Association

approval. The doctoral program in engineering is also accredited by the North Central Association. The American Chemical Society has accredited the undergraduate program of the Department of Chemistry, and the Engineers' Council for Professional Development has accredited the undergraduate program of the School of Engineering.

The University is an institutional member of the following associations:

- American Association of Colleges for Teacher Education
- American Association of Collegiate Schools of Business
- American Chemical Society
- American Council on Education
- American Institute of Physics
- American Mathematical Society
- Council of Graduate Schools in the United States
- Institute of International Education, Incorporated
- Latin American Scholarship Program of American Universities
- Midwestern Association of Graduate Schools
- The Society of the Sigma Xi

MICHIGAN INTERCOLLEGIATE GRADUATE STUDIES (MIGS)

The MIGS program is a cooperative inter-institutional arrangement which permits graduate students to take advantage of educational offerings available at another participating institution but not available at their own. It is open to any student in good standing in a graduate program at a member institution. Courses must be approved in advance by the student's graduate adviser and the MIGS liaison officer at both the home institution and the host institution. Admission by the host university is contingent on the availability of space and resources. The member institutions are Central Michigan University, Eastern Michigan University, Michigan State University, Michigan Technological University, Northern Michigan University, Oakland University, University of Michigan, Wayne State University, and Western Michigan University. Additional information is available in the Office of Graduate Study and from program directors.

CENTRALIZED AND SPECIALIZED RESEARCH FACILITIES

THE OFFICE OF COMPUTER SERVICES

The Office of Computer Services (OCS) provides centralized computing resources to support the instructional, research and administrative activities at Oakland University. Two general-purpose computer systems, an IBM 360/40 and a Burroughs B5500, are housed within specially designed quarters at the central facility (in Dodge Hall). The IBM 360/40 batch processing computer is primarily engaged with management information systems (financial records, student records, etc.) which support the planning, control and operational functions of the University. The large scale Burroughs B5500 timesharing computer offers powerful on-line and batch processing services, oriented to academic applications. Users may interact with

this system either directly at the computing center, or from a number of timesharing terminals located across campus. A broad range of problem solving software is available, including the programming languages COBOL, FORTRAN IV, ALGOL and BASIC. An Academic Services staff develops and maintains a comprehensive scientific and technical program library and offers consulting services to faculty and students.

OCS also maintains a Student Services Room at the central facility, which contains keypunch machines, user work space, reference material and an information desk. Faculty and students are encouraged to avail themselves of these services throughout the development and implementation of their computing assignments.

INSTITUTE OF BIOLOGICAL SCIENCES

The Institute of Biological Sciences of Oakland University occupies some 6,500 net square feet of laboratory and office space contiguous to, but separate from, the facilities of the Department of Biological Sciences. These facilities were constructed with the aid of a matching-funds grant from the National Institutes of Health. The facilities of the Institute include six main research units, each with an office for the principal investigator, and central facilities consisting of a cold room, a computer facility, a radioactive isotope laboratory, an animal holding room, an animal surgery, an instrument room for major pieces of apparatus, and a conference room.

In this modern and well-equipped center a group of research scientists perform grant-supported basic research having applications to medicine and centering in living systems. The aim of the Institute is to bring together many disciplines to concentrate on biological problems. A broadly interdisciplinary program of research in molecular biology, biochemistry, physiology, and pharmacology draws on the combined insights of specialists in engineering, chemistry, physics, and mathematics. Current research is related to eye neurology, eye chemistry, and ophthalmology.

THE INSTRUCTIONAL MATERIALS CENTER

The Instructional Materials Center is a teaching and resource agency of the School of Education. The Center contains a variety of printed materials, such as pamphlets, curriculum guides, and manuals, for research and instructional purposes. Multi-media instructional devices are also concentrated here. In addition to the simpler equipment, such as film strips, tape, and overhead projectors, the Center has facilities to produce and make available for use video tapes and educational television materials. Students have the opportunity to acquaint themselves with new developments in instructional techniques, and educational researchers have at their disposal the technological and recording facilities needed for their investigations.

THE KETTERING MAGNETICS LABORATORY

The Kettering Magnetics Laboratory, built with money given by the Kettering Foundation, constitutes another important research facility. This building is constructed of non-ferrous material and is particularly suited for research requiring accurate cancellation of the earth's magnetic field. The laboratory is used for very accurate measurements of gyromagnetic ratios of ferrous materials (the Einstein-de Haas effect). This work is done in an area in which the ambient magnetic field is reduced to less than one gamma by large

Helmholtz coils. Research is also in progress on a new gas torque effect which appears to be capable of giving information about the rotational gyromagnetic ratios of gas molecules and about collision cross sections of molecules.

THE LIBRARY

Oakland University's library collections are housed in Kresge Library and in a small Performing Arts Library (in Varner Hall) which contains a specialized collection of materials on the performance of music, theatre, and the dance. The collections of the University Libraries now contain approximately 240,000 volumes, 170,000 units of microform, and 6,000 recordings on disc or tape — all in open stacks. The Matilda R. Wilson Memorial Collection of works of reference, amassed through gifts of money from the University's students, constitutes a large part of the collections and provides a substantial research facility. Other remarkable special collections include one of the largest collections in the Midwest of underground newspapers, and the Hicks Collection of books by and about women.

The Library offers many services to its users: audio centers in both Kresge and the Performing Arts Library; a microform reading room; a Documents Department, which houses United States and United Nations publications and is a partial depository for the official documents of the United States and of the State of Michigan; a science area in which are concentrated the monographs, indexes, periodicals, and abstracts that pertain to this broad subject field; a General Reference Department; a Circulation Department with a computerized check-out system; and a Serials Department in charge of about 25,000 periodical volumes as well as other serials.

THE LEARNING STRATEGY CENTER

The Learning Strategy Center is an agency in the School of Education, financed through cooperative ventures with neighboring school districts. The Center produces experimental devices in a variety of areas and develops teaching units for demonstration and model purposes. Scholars and experimentalists from across the nation have participated in preparing special units of instruction, and these units have been made available to cooperating school districts for field trials. Similarly, gifted teachers in cooperating schools have prepared video tapes and other materials demonstrating successful approaches to specific teaching problems. These materials are also disseminated by the Learning Strategy Center.

OFFICE OF INSTITUTIONAL RESEARCH

The Office of Institutional Research concerns itself with research on students. It maintains research-oriented files of student information and carries out analysis of these data to aid the University in planning and in program development. It also assists faculty and students in organizing, systematizing, and carrying out research regarding student behavior and learning. In addition, its staff is available for consultation on problems in social research wherever appropriate.

UNIVERSITY INSTRUMENT AND ELECTRONICS SHOPS

The University maintains several machine shops to serve the academic community. The Student Shop has a basic complement of machine tools for the use of students who wish to construct devices

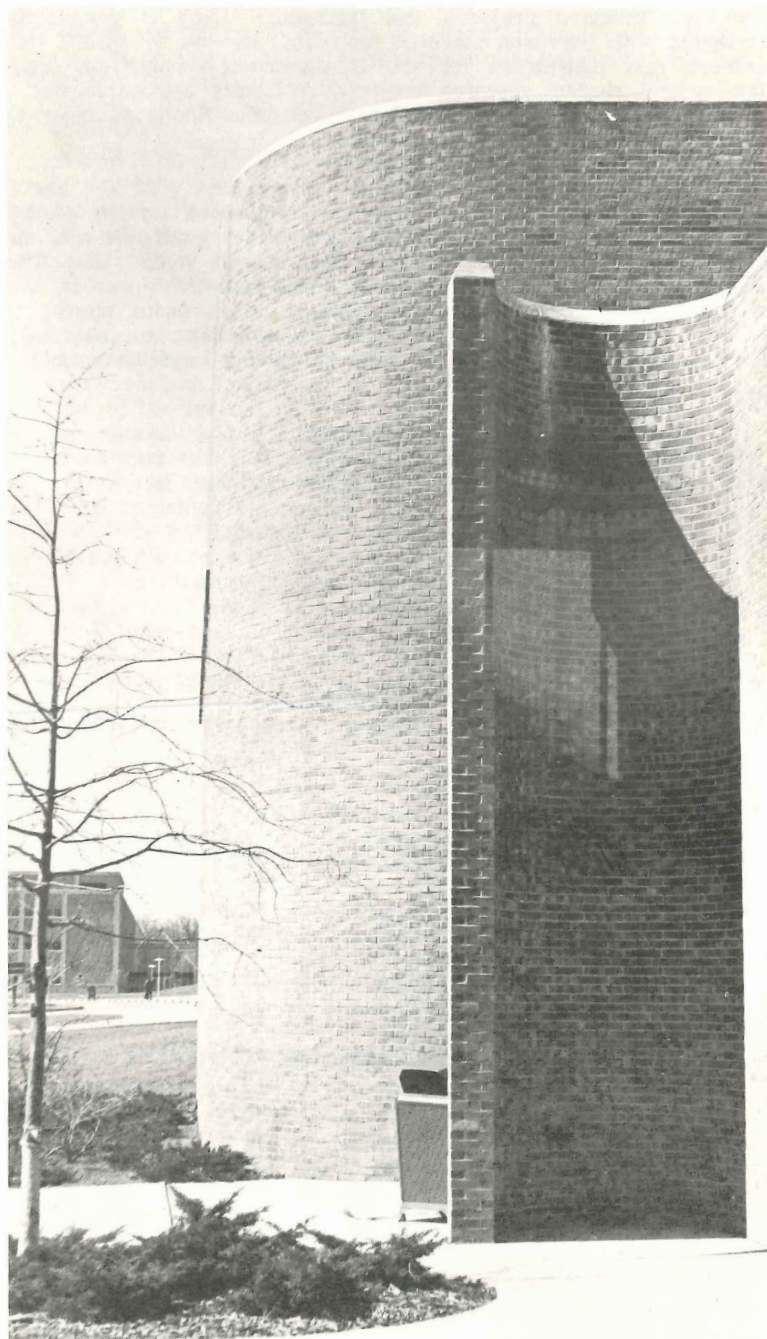
for their research projects. The Instrument Shop is completely equipped with precision machine tools and manned by skilled machinists and instrument makers. It constructs devices for both faculty and student research projects. A faculty committee works with the University Instrument and Electronics Shops Manager to insure an equitable allocation of resources.

UNIVERSITY READING CENTER

The University Reading Center is primarily a service agency of the School of Education through which undergraduates may receive assistance in improving their reading and study skills. The Center is not merely a clinical facility for remedial purposes, but also is designed to assist already skillful students in improving themselves further. The Reading Center also functions as a laboratory for research and training in the field of reading improvements.

OTHER RESEARCH FACILITIES

A further description of research facilities and activities of the departments and schools offering graduate programs may be found in the appropriate sections of the graduate catalog.



GENERAL INFORMATION

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SECTION I ADMISSION

REQUIREMENTS FOR ADMISSION TO A DEGREE PROGRAM

The graduate admissions policy of Oakland University is selective. Degree program applicants must have official transcripts and letters of recommendation sent directly by their originators to the Office of Graduate Study. Detailed instructions are included in the "Application for Admission to Graduate Study," available from this office. Additional admissions information may be found in the sections of this catalog describing the programs offered by the various schools and departments. Admission will be granted by the Dean of Graduate Study on recommendation by the department or school concerned and is based on the applicant's undergraduate record, letters of recommendation, and such other evidence as may be required.

An applicant must hold a baccalaureate or its equivalent from an accredited undergraduate institution. Some graduate departments offer Oakland undergraduate students opportunity to take their bachelor's and master's degrees concurrently, but this is done only with the written permission of the department. A planned course of study to satisfy the requirements for both degrees is necessary and a copy of the plan will be included in the student's official graduate file.

CONDITIONAL ADMISSION

If an applicant's grade point is below program requirements a conditional admission may be authorized by the department or school involved with the concurrence of the Dean of Graduate Study. Occasionally students are admitted who are judged insufficiently prepared to undertake course work for graduate credit. Such students are required to complete additional course work, specified by the program area involved, without credit towards a degree. Students who do not meet the conditional requirements stipulated on admission are subject to dismissal. While in a conditional status students will not be eligible to receive their degree or transfer credits from other institutions.

SPECIAL GRADUATE STATUS

Special Graduate status may be granted by some departments to a student who wishes to take graduate courses but not to work toward a degree. For example, an applicant wishing to work toward permanent or continuing teacher certification might choose to apply for admission under this status. A student in Special Graduate status is not assigned an adviser. Credit earned at Oakland University under Special Graduate status—but none that has been earned at another institution—will be officially recorded. This credit may be applied toward degree requirements if a student later gains admission to a degree program and if the credit is appropriate to the degree objective. However, admission as a Special Graduate student in no way assures subsequent admission to a degree program. If a student in this status wishes to apply for admission to a program he or she must file a request for change of status with the Office of Graduate Study and provide official transcripts and letters of recommendation. A decision on the admission is then made by the academic department or school with concurrence of the Dean of Graduate Study.

POST MASTER'S STATUS

Post Master's status may be granted by some departments to a student who holds a master's degree and wishes to take additional graduate courses but not to work toward a second degree. The Post Master's status is similar to that of the Special Graduate student and the same rules and procedures apply. Subsequent admission to a program to work toward a second master's degree requires filing a request for a change of status with the Office of Graduate Study and providing official transcripts and letters of recommendation.

POST BACCALAUREATE STATUS

Post baccalaureate status may be granted applicants who have a bachelor's degree from an accredited college or university and who wish to enroll in undergraduate courses, either to develop an additional major or to prepare for admission to a degree program. Application for this type of admission should be made through the undergraduate admissions office.

APPLICATION FOR ADMISSION BY FOREIGN STUDENTS

Foreign students should write to the Office of Graduate Study at least six months prior to the date they hope to enter the University. They will be sent instructions and application forms, which they should complete and return promptly. If their applications are approved, they will receive a certificate of admission to the University. Foreign students are normally required to submit scores from the Graduate Record Examination Aptitude Tests prior to admission, and scores from one or more Advanced Tests of the Graduate Record Examination may be required at the discretion of the department or school concerned. Scores from the Test of English as a Foreign Language (TOEFL) or a comparable examination are also required.

SECTION II PROCEDURES

TIME LIMIT

Credit earned more than six calendar years before a master's degree is to be granted may not be used to fulfill the degree requirements.

ACADEMIC ADVISING

Every student admitted to a graduate degree program is assigned an adviser or an advising committee upon admission. The advisers will be faculty members ordinarily in the school or department in which the student is enrolled. Graduate students not in a degree program do not have access to formal advising arrangement; they should contact the appropriate academic department if advice regarding course selection is needed.

TRANSFER CREDIT

Graduate students who are in a degree program and wish to transfer credit from other colleges or universities must have such credit approved by their academic advisers and the Dean of Graduate Study. Applications should be filed after the first semester of work is completed at Oakland and, in any event, not later than the first week of the semester in which the student expects to graduate. Transfer of credit applications are available in the academic

offices. A maximum of 12 semester hours (10 in the Department of Chemistry) is acceptable toward a graduate degree. One semester hour equals one credit hour. Conversely, 20 or 24 semester hours constitute the normal minimum residence requirement, depending on the number of hours required by the department or the school for a degree. After its approval, transfer credit will appear on the student's official transcript in the Office of the Registrar. Credit earned more than six years before the degree is to be granted may not be applied towards master's degree requirements.

COURSES TAKEN AS AN UNDERGRADUATE

Up to 12 credits taken while a student is an Oakland undergraduate may be applied to a graduate program if the courses have not been presented by the student in fulfillment of any part of the requirements for the bachelor's degree, are applicable to the student's graduate program and are approved by the student's adviser or program committee and the Dean of Graduate Study.

COURSE COMPETENCY CREDIT

Competency examinations are offered by some departments. Students should consult with their advisers for specific information and must register and pay fees during the normal registration period. University legislation stipulates that the examination must be taken not more than six weeks after the close of registration.

CHANGES IN ENROLLMENTS (ADD/DROPS)

A graduate student wishing to add or drop a course may secure the appropriate form from the academic office of the area in which he or she is enrolled. A student who is simply dropping a course will need only the signature of the instructor; a student adding a course will also need the signature of the instructor of the new course. The Add/Drop form is then presented to the Registrar for processing. If a refund is involved it will be mailed to the student. A grade of "N" is assigned for courses dropped after the second week of classes.

WITHDRAWAL

A graduate student wishing to withdraw from the University may do so by notifying the Office of Graduate Study which will initiate a withdrawal form and process it through the Office of the Registrar. The withdrawal is recorded by the Registrar and the amount of refund, if any, determined. If a refund is due it will be mailed to the student. When a student withdraws from the University a grade of "N" will be assigned in all unfinished courses.

INACTIVE STATUS REQUIRING READMISSION

A student who has been admitted to a program but has not registered for an Oakland University course for twelve months or more is considered inactive. In order to return to the degree-seeking status, such students must apply for readmission and pay a readmission fee.

CREDIT SYSTEM

The unit of credit is the semester hour. Courses carry 4 credits unless otherwise specified. No graduate student may register for more than 12 credits without written authorization of his or her adviser.

COURSE NUMBERING SYSTEM

Courses numbered 100 to 299 are introductory or intermediate undergraduate courses. Courses numbered 300 to 499 are advanced courses primarily for undergraduates. Courses numbered 500 and above are primarily for graduate students. A department or school at its discretion may authorize or refuse to authorize graduate credit for any course numbered 300 to 499.

GRADING

To qualify for a master's degree a student must have an average of at least 3.0 in all courses taken at Oakland University as a graduate student. No grade below 2.0 may be applied toward a graduate degree. In programs of the School of Education and Developmental Psychology two courses below 3.0 automatically render a student subject to dismissal, as does one grade below 2.5 in Developmental Psychology and one below 2.0 in the School of Education.

"S" Grade — A grade of "S" (Satisfactory) is given in certain selected courses and is meant to imply 3.0 or better in any course numbered at or above the 500 level. This grade carries credit toward graduation but is not used in computation of the grade point average.

"I" Grade — The "I" (Incomplete) grade is a temporary grade that may be given only after the thirteenth week in a course in which a student is unable to complete the required work because of severe hardship beyond the control of the student.

The "I" grade must be removed by completing the required work before the deadline set by the instructor but in no case later than four weeks after the beginning of the next semester that the student is in residence, otherwise a grade of "N" will be recorded. If more than three semesters intervene before the student resumes residence, then the "I" grade becomes an "N" grade.

"N" Grade — The grade of "N" (No grade) is assigned whenever a student registers for a course but for any reason does not receive credit for that course (except when a temporary grade of "I" or "P" has been assigned). The "N" grade will appear on the grade report, but will not be recorded on the transcript of the student.

"P" Grade — The grade of "P" (Progress) is a temporary grade that may be given only in a course that could not be completed in one semester. A department that wishes to assign the grade of "P" must receive approval for such courses from the dean of the appropriate school or college prior to the enrollment of students. Such courses are usually research projects. The grade is given only when the work completed to that point has been satisfactory in every respect.

"P" grades must be removed within two calendar years from the date of assignment. If not removed within the time limit, the "P" will be changed to an "N".

RESTRICTION OF STUDENT RECORDS

The records of students who fail to pay required fees, to submit complete application materials, or to satisfy admission or

retention conditions are subject to restriction. Such students may not register for classes for a subsequent semester or session and are not eligible to apply for a degree while the restriction is in effect. Transcripts of work done at Oakland and information to prospective employers may also be withheld until the restriction is lifted.

APPLICATION FOR DEGREE

Students intending to graduate at the end of a semester (or session) must fill out an Application for Degree either when registering for the last semester or by the date indicated in the schedule for that semester. A candidate who does not graduate in that semester must re-apply.

TERMINAL PROJECTS

A copy of final reports describing the results of terminal projects will be sent to the Graduate Office after the report has been approved by the project director. They will be made available to students and other interested members of the university community.

MASTER'S AND DOCTORAL THESES

Guidelines for preparation of theses are available in the Office of Graduate Study.

SECTION III FEES

GENERAL POLICY

The Board of Trustees of Oakland University reserves the right to change any and all rates of charge at such times as conditions or circumstances may make change necessary. All charges are assessed and payable in U.S. dollars. Checks and money orders should be made payable to Oakland University. The University urges students to use checks or money orders rather than cash in paying fees. If those checks or money orders are in excess of the required payments, the balance will be given to the student.

APPLICATION FEE

A fee of \$15 must accompany an application for admission to a degree program. This is a processing fee and is not refundable.

READMISSION FEE

A student who has been admitted to a degree program but has not been registered in any Oakland course or research activity for twelve months or more must apply for readmission. A fee of \$15, which is not refundable, will be assessed at that time.

COURSE FEES

Course fees for each semester are assessed on the basis of the credit value of the course taken. Partial payment in connection with early registration is a service offered to students, but no registration is considered final until all fees are paid. Students who have not registered early must pay all course fees in full at registration. Graduate course fees for Michigan residents are \$24 for each credit hour carried. The corresponding fee for nonresidents is \$51. One credit hour is the equivalent of one semester hour.

LATE REGISTRATION FEE

Students registering or paying fees after the regular registration date are required to pay a non-refundable \$15 late fee.

SPECIAL FEES

Graduate students who register for 10 or more credits are charged an additional \$11 (\$10 student center fee, and \$1 Wilson Memorial library fee). They must pay these special fees at registration.

PARKING FEE

Students who will find it necessary to park on campus before 4:30 p.m. must pay a parking fee and may do so during registration. Parking of automobiles is regulated by the University's Department of Public Safety. For further information students should contact the Public Safety Office.

RESIDENT HOUSING: RESERVATIONS, DEPOSIT, FEES

The Residence Halls are financially self-supporting. Room and Board fees reflect the annual cost of operation and are established by the University's Board of Trustees. The 1974-75 rate for Room and Board is \$1342 for the academic year. Special options such as: room only, single rooms and cooperative housing are available to graduate students. If the student signs a housing contract prior to or during the Fall Semester, that contract is binding for both the Fall and Winter Semesters. If the contract is signed during the Winter Semester or Spring or Summer Session, it is binding for the single semester or session. The Room and Board fee is due at registration or may be paid in four installments, the first of which is due at registration. The second, third and fourth installments are due on the first day of the three months following registration. If a student withdraws from the University, housing fees are refunded on a prorated basis.

REFUND OF FEES

A student who withdraws from the University or drops a course which reduces his or her total credit load may receive a refund of fees upon application to the appropriate office. Graduate students withdrawing from the University apply to the Office of Graduate Study. Changes in enrollment are processed in the Office of the Registrar. The amount of refund will be based on the following schedule.

Date Application is Received	Tuition Refund
Before the beginning of classes	100%
After the beginning of classes and before the beginning of the second week	80%
During the second week of classes	70%
During the third week of classes	60%
During the fourth week of classes	50%
During the fifth week of classes	40%
During the sixth week of classes	30%
During the seventh week of classes	20%
After the beginning of the eighth week of classes	0%

The date the application is received in the Office of Graduate Study determines the percentage of refund.

OUT-OF-STATE TUITION REGULATIONS

Students enrolling at Oakland University shall be classified as in-state or out-of-state students for purposes of assessing tuition charges. It is the student's responsibility to register each semester or session under the proper in-state or out-of-state classification. For the purpose of these regulations, an in-state resident shall be defined as a person who has a Michigan domicile and has resided in Michigan twelve (12) months immediately preceding enrollment.

A student who was originally classified as an out-of-state student may be reclassified as an in-state student only if he or she has become a bona fide domiciliary of Michigan for at least twelve (12) consecutive months, primarily as a permanent resident and not merely as a student. Students shall not be considered domiciled in Michigan unless they have been in continuous physical residence in the State and intend to make Michigan their home, not only while in attendance at the University, but indefinitely thereafter. Questions regarding residence matters may be directed to the Chairman, Out-of-State Rules Committee, 263 South Foundation Hall, Oakland University, Rochester, Michigan 48063.

SECTION IV FINANCIAL AID, ASSISTANTSHIPS AND SCHOLARSHIPS

STUDENT LOANS

FEDERAL STUDENT ASSISTANCE PROGRAMS: National Direct Student Loans and College Work Study Program employment are offered on the basis of need. Loans have a low interest rate with a long repayment period. To be eligible for these programs a student must be able to prove need and must be (1) a citizen of the United States, or (2) have the status of an Immigrant, or (3) possess a permanent visa. Application for federal student assistance should be made through the Financial Aid Office after admission to a program.

FEDERALLY INSURED GUARANTEED LOAN PROGRAM: This is a low interest loan program with a long repayment period. Only citizens of the United States or those in immigrant or permanent visa status are eligible. Information may be obtained by writing the Financial Aid Office.

PART-TIME EMPLOYMENT

Although demand usually exceeds supply, on-campus jobs of varying kinds and durations are provided for full-time students who wish to work during the school year. Students seeking employment should register in the Financial Aid Office. Most students who have part-time employment work between ten and twenty hours each week. The Student Employment Office also assists with part-time off-campus jobs.

ACTION INTERNSHIPS

Graduate students are invited to apply for internship positions with the Oakland University "University Year for ACTION" program (UYA). The UYA program is federally supported by the ACTION Agency (i.e. Peace Corps, VISTA, SCORE, ACE, etc.). Its programmatic focus enables students to assist service agencies and clients

of low economic or disadvantaged circumstance while progressing towards a degree. Students selected as interns receive approximately \$3,000 per year and various fringe benefits. The program is open to citizens of the United States or those possessing a permanent visa. Those who wish additional information should contact the UYA Office, Oakland University.

GRADUATE ASSISTANTSHIPS AND SCHOLARSHIPS

A limited number of graduate assistants are appointed in schools and departments offering graduate degree programs. Stipends range up to \$3,200 for two semesters, depending on assignments, hours of work required and qualifications of the assistant. Scholarships in the amount of tuition and fees are available on a competitive basis. Both assistantship and scholarship nominations are made by the individual departments offering graduate programs. Foreign students are eligible to apply. Graduate assistants must be registered each semester or term in which they hold assistantships.



COLLEGE OF ARTS AND SCIENCES

AREA STUDIES FACULTY

Chairman:

Robert C. Howes

(Italics in the following list designate departmental affiliation)

Professors:

Sheldon L. Appleton, *Political Science*, Ph.D.,
University of Minnesota
Richard M. Brace, *History*, Ph.D., University of California
(Berkeley)
William C. Forbes, Jr., *Biological Sciences*,
Ed.D., Columbia University, Ph.D., University of Connecticut
Edward J. Heubel, *Political Science*, Ph.D.,
University of Minnesota
Robert C. Howes, *History*, Ph.D., Cornell University
Helen Kovach, *Russian*, Ph.D., Elizabeth University (Hungary)
Richard A. Mazzara, *French*, Ph.D., University of Kansas
John Rue, *Political Science*, Ph.D., University of Minnesota
Amitendranath Tagore, *Chinese*, Ph.D., Visva Bharati University
S. Bernard Thomas, *History*, Ph.D., Columbia University

Associate Professors:

Richard W. Brooks, *Philosophy*, Ph.D., University of Minnesota
William C. Bryant, *Spanish*, Ph.D., University of California
(Berkeley)
Karl D. Gregory, *Economics and Management*,
Ph.D., University of Michigan
James W. Hughes, *Education*, Ed.D.,
University of New Mexico
Dmytro Ijewliw, *Russian*, Ph.D., University of Ottawa
(Canada)
Kathryn M. McArdle, *Spanish*, Ph.D.,
Universidad Central de Madrid
James R. Ozinga, *Political Sciences*, Ph.D.,
Michigan State University
Munibur Rahman, *Hindi-Urdu*, Ph.D., University of London
Richard P. Tucker, *History*, Ph.D., Harvard University

Assistant Professors:

Peter J. Bertocci, *Anthropology*, Ph.D.,
Michigan State University
Carlo Coppola, *Hindi-Urdu and Linguistics*,
M.A., University of Chicago
James W. Dow, *Anthropology*, Ph.D., Brandeis University
Jerry M. Freeman, *Russian*, Ph.D., University of Michigan
Ralph F. Glenn, *Art History*, A.M., Harvard University
Alice C. Gorlin, *Economics*, Ph.D., University of Michigan
James D. Graham, *History*, Ph.D., Northwestern University
Bruce R. Harker, *Education*, Ph.D., University of Chicago
Marvin D. Holladay, *Music*, B.M.Ed., Phillips University
John Hurd II, *Economics*, Ph.D., University of Pennsylvania

Assistant Professors: (Cont'd)

William D. Jaymes, *French*, Ph.D., University of Kansas
Mary Karasch, *History*, Ph.D., University of Wisconsin
Cecelia F. Klein, *Art History*, Ph.D., Columbia University
Janet A. Krompart, *Library*, M.L.S., University of California
(Berkeley)
John Marney, *Chinese*, Ph.D., University of Wisconsin
Lawrence D. Orton, *History*, Ph.D., Indiana University
Colin Palmer, *History*, Ph.D., University of Wisconsin
I. Michael Solomon, *History*, Ph.D., Columbia University
Robert J. J. Wargo, *Philosophy*, Ph.D., University of Michigan

Instructors:

Lawrence T. Farley, *Political Science*, Ph.D.,
University of Denver
Vincent B. Khapoya, *Political Science*, M.A.
University of Denver
Mariano Pallarés, *Spanish*, M.A., University of Wisconsin

Special Instructors:

Cordell W. Black, *French*, M.A., Wayne State University
Lee M. Corrigan, *Russian*, M.A., Middlebury College
Shih-Chen Peng, *Chinese*, M.A., Seton Hall University

Lecturers:

Benon Turyakikayo-Rugyema, *History*, M.A.,
University of Michigan

THE MASTER OF ARTS IN AREA STUDIES

Area studies are concerned with the understanding of living civilizations whose physical bases and cultural manifestations—art, government, history, language, literature, music, philosophy, religion, and social organizations—are the subject of study of a number of departments in a university. The interdepartmental area studies faculty of Oakland University offers coordinated programs of instruction in many aspects of the civilizations of five major geographical-cultural areas of the world: East Asia (China and Japan), South Asia (India, Pakistan, Bangladesh), Africa, Latin America, and the Slavic world.

The Master of Arts in Area Studies is designed to meet the needs of two types of student: those who desire cross-cultural breadth of study and those who prefer to specialize in one geographical-cultural area. To this end, two tracks, or concentrations, are offered: the Concentration in Comparative Studies and the Concentration in a Major Civilization. Successful completion of either concentration leads to the degree of Master of Arts in Area Studies.

Admission to Course

An applicant for admission to the Master of Arts program in Area Studies must hold a bachelor's degree from an accredited institution. Admission decisions are based on transcripts and recommendations. These must give evidence of academic distinction and promise. A grade point average of 3.0 in undergraduate work will ordinarily be the minimum standard for admission although other candidates of superior promise may be admitted on condition that their academic deficiencies be removed. Credentials should be

submitted to the Office of Graduate Study no later than six weeks before the beginning of the term in which the student wishes to enter the program. Students will be admitted for any of the four terms of the academic year. After acceptance into the program each candidate will select two area faculty members who are willing to serve as his or her program coordinator. One of these members will accept primary responsibility for advising and assisting the student in planning the individual program.

THE CONCENTRATION IN COMPARATIVE AREA STUDIES

This concentration is designed for persons who wish to emphasize geographical and cultural breadth through interdisciplinary study of two or more areas. Although designed especially for secondary school teachers, the program is open to other qualified candidates.

Each candidate's program will be organized, in consultation with his or her Program Committee, along a broad integrating concept, or theme. Possible themes are: classical civilizations, revolution, peasants and urbanization, comparative literature, development and modernization.

Requirements for the Degree

Nine courses (36 hours) are required. Of these, seven—including AS 690—must be from the list below. With permission of the candidate's Program Committee, two related courses may be taken for credit. Each candidate must complete AS 690 The Master's Project, consisting of either an independent research paper or a curriculum design. Language study, although strongly recommended as the most basic and reliable means for penetrating a foreign culture, is not a formal requirement. The alternative to a reading knowledge of an appropriate foreign language is the satisfactory completion of at least two courses in an appropriate foreign literature in translation.

THE CONCENTRATION IN A MAJOR CIVILIZATION

This concentration is designed for research-oriented students who wish to specialize in advanced, interdisciplinary study of a major geographical-cultural area. At the present time this concentration is available in Latin American studies and in Slavic studies. All candidates' programs will be organized in consultation with their Program Committees.

Requirements for the Degree

Nine courses (36 hours) are required. Of these, eight must be from the list below and must deal primarily with the area of the student's primary interest (Latin America or the Slavic world). One elective is allowed.

A reading knowledge of a foreign language appropriate to the student's area of concentration is required. Each candidate must complete a graduate seminar and AS 690 The Master's Project. The latter includes the preparation of a detailed research thesis.

Course Offerings

(One credit hour is equal to one semester hour.)

Most of the courses listed below are offered by academic departments of Oakland University as part of their degree programs. As such, many of them have prerequisites. Therefore, all Area Studies MA candidates wishing to register for any of these courses must secure the permission of their Program Committees and of the instructors of the courses before registering. Forms for recording the instructor's permission are available in the Area Studies Office.

AH 300 CHINESE ART (4 credits)

The history of Chinese artistic expression in painting, sculpture, ceramics, and bronze from the Shang Dynasty, ca. 1550 B.C., to the founding of the Chinese Republic, A.D. 1912.

AH 301 JAPANESE ART (4 credits)

The development of architecture, sculpture, and painting in Japan from the 5th to the 19th century A.D.

AH 304 JAPANESE PAINTING (4 credits)

The major styles of Japanese painting of the Heian period of the 10th through the 12th century A.D. through the Zen Buddhist artists, and the Kano and Nanga painters of the Edo period, A.D. 1615-1868.

AH 320 BYZANTINE ART (4 credits)

The development of architecture, sculpture, and painting in the Eastern Roman Empire from A.D. 350 until the Turkish conquest of Constantinople in A.D. 1453.

AH 490 PROBLEMS IN ART HISTORY (4 credits)

Directed research in specific subject areas of, or approaches to, art history. May be taken in different semesters under different instructors for a total of 8 credits or, with permission of instructor and departmental chairman, may be taken in one semester for a total of 8 credits, in which case a "P" grade may be given.

AN 321 PROBLEMS OF SOCIAL AND ECONOMIC CHANGE (4 credits)

The role of anthropology in the implementation of programs of socio-economic development is examined, using examples from non-Western areas. The activities of the United Nations and of national governments in the development field are reviewed.

AN 351 SOCIAL ANTHROPOLOGY OF SELECTED AFRICAN SOCIETIES (4 credits)

Intensive studies of selected societies in Africa. The course will emphasize social anthropology, including social organization and the social process, political systems, kinship, economic organization and religious systems.

AN 361 CONTEMPORARY SOUTH ASIAN SOCIETY (4 credits)

A study of contemporary rural and urban society in India and Pakistan. Emphasis is placed on social, economic, political, and religious life, as well as on problems of cultural change.

AN 371 CULTURES OF MESOAMERICA (4 credits)

Reviews anthropological studies of Indian and Mestizo societies in Mexico and Guatemala. This course will examine the separate socio-economic patterns of these two social types and also their integration into a dualistic social system.

AN 372 INDIANS OF SOUTH AMERICA (4 credits)

This course will examine the various adaptations that the native South Americans have made to the different environments that exist in that part of the world. Special South American Indian institutions such as ritual warfare, and dual social organization will be studied. Some of the cultural groups that will be included are: circum-Caribbean tribes and chiefdoms, Andean peasants and herders, tropical forest horticulturalists, Brazilian highland Indians, forest and plains nomads, and southern fishing tribes.

CHE 310 LITERARY CHINESE (4 credits)

Studies based upon literary texts of Confucius, Mo Tzu, etc.

CHE 320 READINGS IN CHINESE NEWSPAPERS (4 credits)

Selections from newspapers of mainland China, Taiwan, and southeast Asia.

CHE 330 READINGS IN CHINESE COMMUNIST DOCUMENTS (4 credits)

Studies in documentary style of Chinese, selected mainly from writings of twentieth century political leaders of China.

CHE 340 TWENTIETH CENTURY CHINESE LITERATURE (4 credits)

Studies in the modern pai-hua literature, including short-stories, poems, essays, pamphlets.

CHE 410 TRADITIONAL CHINESE FICTION AND DRAMA (4 credits)

Studies in texts and criticism of classical drama from Yuan and other dynasties.

CHE 421 SELECTED CLASSICAL TEXTS (4 credits)

Studies of texts in advanced literary Chinese.

CHE 431 CLASSICAL CHINESE STORIES (4 credits)

Studies of selected stories from different classical Chinese sources.

CHE 440 CHINESE POETRY (4 credits)

Selections from either classical T'ang and Sung Dynasty poems or from the post May 4th movement of poetry.

CHE 490 DIRECTED READINGS AND RESEARCH IN CHINESE (2, 4, or 8 credits)

For students with a high degree of competence in the language. Might be conducted either in literary Chinese or in modern languages.

ECN 323 INTERNATIONAL TRADE AND FINANCE (4 credits)

The theory of international specialization and exchange, commercial policy, national income and balance of payments, monetary relations, foreign investment, and current issues of international economic policy.

ECN 326 ECONOMIC DEVELOPMENT (4 credits)

Application of the tools of economic analysis to the problems of economic development and growth.

ECN 327 AFRICAN ECONOMIC DEVELOPMENT (4 credits)

The application of the tools of economic analysis to: the historical development of African economies; the evaluation of current strategies for their economic development; and the role of the developed countries.

ECN 350 ECONOMIC STRUCTURES AND SYSTEMS (4 credits)

A comparative analysis of the principles, structures, and ideologies of capitalism, socialism, and the command economy, with special emphasis on the processes of economic decision making.

ECN 418 SELECTED TOPICS IN ECONOMIC POLICY (4 credits)

ED 581 TEACHING ABOUT BLACK AFRICA IN THE PUBLIC SCHOOLS (4 credits)

This course includes (1) content of both contemporary and historical topics of Black Africa applicable to new social studies programs in elementary and secondary curricula, (2) material evaluation, selection and use of Black African topics appropriate for elementary and secondary use, and (3) organization and development of an instructional unit on Black Africa for elementary and secondary schools.

ED 586 EDUCATION OF THE SPANISH-SPEAKING OF THE UNITED STATES (4 credits)

This course is intended to provide an opportunity for teachers and other educators to become familiar with the negative and positive aspects of Latino Education. Lectures, readings, and discussions will deal with background information about the Spanish-speaking in the U.S.; the problems that confront Latinos in the educational system; and the effective and promising approaches to educating the Spanish-speaking.

ED 587 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 relationships among discipline areas comprising the social studies. The course will stress application of these studies in urban area elementary schools.

ED 603 CROSS-CULTURAL STUDIES IN EDUCATION (4 credits)

This course offers an opportunity for study of educational systems other than that of the United States. Special attention is given to education's relationship to language policy, national unification, and economic development. Europe, Asia, and Africa provide the setting for consideration of the instrumental role schools play in defining equal opportunity and individual's subsequent life-chances in their society.

HST 370 CHINA: BEGINNINGS TO MID-T'ANG, CA. 750 (4 credits)

China's prehistoric and classical foundations, the first phase of imperial unification, the Han intellectual and state synthesis, and the aftermath of Han collapse, with special attention given to the effects of Buddhist, foreign, and heterodox native influences in the subsequent development of the T'ang cosmopolitan universal state. Offered in alternate years.

HST 381 HISTORY OF EARLY INDIA (4 credits)

The history of India from the most ancient times to the coming of the Mughals in the early years of the sixteenth century. Offered in the fall semester.

(Descriptions of the following history courses may be found in the section on the M.A. in History in this catalog.)

HST 520 U.S. DIPLOMATIC HISTORY TO 1898 (4 credits)

HST 521 U.S. DIPLOMATIC HISTORY SINCE 1898 (4 credits)

HST 552 KIEV AND MUSCOVY (4 credits)

HST 553 IMPERIAL RUSSIA (4 credits)

HST 554 SOVIET RUSSIA (4 credits)

HST 559 RUSSIAN INTELLECTUAL HISTORY TO PETER THE GREAT (4 credits)

HST 560 RUSSIAN INTELLECTUAL HISTORY SINCE PETER THE GREAT (4 credits)

HST 563 HISTORY OF SOUTHERN SOUTH AMERICA (4 credits)

HST 565 THE RESPONSE TO EUROPEAN COLONIALISM (4 credits)

HST 566 SLAVERY AND RACE RELATIONS IN THE NEW WORLD (4 credits)

HST 567 PRE-COLUMBIAN AND COLONIAL MEXICO (4 credits)

HST 571 CHINA: MID-T'ANG TO THE PEAK OF MANCHU POWER, ca. 1800 (4 credits)

The institutional, intellectual, and aesthetic responses to the failure of T'ang cosmopolitanism, the elaboration of gentry economic controls, neo-Confucian orthodoxy, the literati ethos, and Chinese accommodations to the problems of foreign encroachment and foreign rule. Offered in alternate years.

HST 573 NINETEENTH CENTURY CHINA (4 credits)

Imperial China during the half century preceding the Opium War of 1839-42, China's growing crisis in the context of the massive Western impact during the second half of the nineteenth century, and the collapse of the traditional Chinese order in the first two decades of the twentieth century. Offered each year.

HST 574 NATIONALISM AND COMMUNISM IN CHINA (4 credits)

The patterns of revolutionary nationalism in China from 1919 to the present, focusing on the Nationalist (Kuomintang) and Communist periods. Offered each year.

HST 582 THE MUSLIM TRADITION IN INDIA AND PAKISTAN (4 credits)

The establishment of Muslim power and culture in South Asia, its accommodation with Hindu culture, the Mughal empire and its decline, and the rise of modern Islamic nationalism, leading to the creation of Pakistan and Bangladesh. Offered in alternate years.

HST 583 BRITISH IMPERIALISM AND HINDU NATIONALISM IN INDIA, 1740-1947 (4 credits)

Society and politics in eighteenth century India, changing patterns of imperial rule, the Hindu Renaissance, and nationalist politics, religious, liberal and Marxist. Offered every winter.

HST 586 AFRICAN SOCIALISM (4 credits)

The ideologies, tactics, and techniques of various recent socialist revolutions in Africa and the relation of African socialist aims to traditional and colonial Africa as well as to other forms of socialist thought and practice. Offered in alternate years.

HST 587 NORTHWESTERN AFRICA (THE MAGHRIB) SINCE 1830 (4 credits)

The Maghrib from the time of the French occupation to the present. Offered at irregular intervals.

HST 588 TWENTIETH CENTURY AFRICA (4 credits)

African resistance and nationalist movements from 1875 to the present and the development of Pan-Africanism and Negritude in colonial and contemporary times. Offered in alternate years.

HST 602 COLLOQUIUM IN LATIN AMERICAN HISTORY (4 credits)

HST 603 COLLOQUIUM IN EUROPEAN HISTORY (4 credits)

HST 604 COLLOQUIUM IN AFRICAN HISTORY (4 credits)

HST 605 COLLOQUIUM IN EAST ASIAN HISTORY (4 credits)

HST 606 COLLOQUIUM IN SOUTH ASIAN HISTORY (4 credits)

HST 692 SEMINAR IN LATIN AMERICAN HISTORY (4 credits)

HST 693 SEMINAR IN EUROPEAN HISTORY (4 credits)

HST 694 SEMINAR IN AFRICAN HISTORY (4 credits)

HST 695 SEMINAR IN EAST ASIAN HISTORY (4 credits)

HST 696 SEMINAR IN SOUTH ASIAN HISTORY (4 credits)

PHL 351 CHINESE PHILOSOPHY (4 credits)

Systematic study of the rise and development of Chinese philosophy, with emphasis on the classical (Chou) period. Confucianism, Taoism, Mohism, Legalism, the "Hundred Schools." The impact of Buddhism on Chinese philosophical thinking will be examined with special reference to the growth of Ch'an (Zen) Buddhism. Offered every other year.

PHL 352 INDIAN PHILOSOPHY (4 credits)

An examination of the presuppositions and doctrines of India's major philosophic systems. Both Indian logic and metaphysical speculation will be covered. Realistic, idealistic, pluralistic, dualistic, and monistic systems will be considered, with some reference to contemporary developments. Offered every other year.

POR 390 DIRECTED READINGS IN PORTUGUESE (2 or 4 credits)

A reading course for students interested in research in a particular Portuguese-language area. Especially suited to area studies majors. Bibliography to be determined by students and instructor. Discussions in Portuguese or English. Paper optional. May be repeated for credit.

PS 330 COMPARATIVE POLITICAL THEORY (4 credits)

An examination of the various approaches and theories that are used in comparative political research, including theories of development and modernization.

PS 332 POLITICS OF THE MIDDLE EAST AND NORTH AFRICA (4 credits)

Examination of the politics of the Middle East and North Africa. The cultural and historical factors that influence the contemporary politics of the area will be emphasized. Topics include religion, social structures, economic problems, the impact of the West, and the Arab-Israel conflict.

PS 333 AFRICAN POLITICS (4 credits)

Examination of politics of selected African states, emphasizing West Africa. The primary focus of the course is on political develop-

ment. Attention is given to traditional and colonial politics as well as to individuals, groups, and institutions that make up the present political process. Offered in the winter semester.

PS 334 POLITICAL SYSTEMS OF SOUTHERN ASIA (4 credits)

Examination of the elements of political life in India and Pakistan. The cultural, historical, social, and economic factors that influence contemporary political institutions; the issues; and the processes by which political conflicts are resolved will be studied. Politics in Ceylon, Nepal, and Himalayan border kingdoms may also be considered.

PS 335 POLITICS OF LATIN AMERICA (4 credits)

Analysis of the political systems of Latin America and the historical, social, and economic factors underlying them. The major countries are studied intensively, and a comparative approach is used to examine the variations from democracy to dictatorship and the political instability that characterizes the area. Offered in the fall semester.

PS 336 U.S.-LATIN AMERICAN RELATIONS (4 credits)

Analysis of contemporary relations of the United States with the countries of Latin America. Relations with particular countries will be studied as well as the overall economic, military, and diplomatic aspects of our Latin American policy. The Inter-American system and regional groupings with Latin America will also be studied. Offered in the winter semester.

PS 337 THE SOVIET POLITICAL SYSTEM (4 credits)

A descriptive analysis of the Soviet society as a political system; its origins, institutions, and political behavior. Trends and developments in the system will be assessed, and comparisons with other political systems will be undertaken. Offered in the winter semester.

PS 338 MODERN CHINESE POLITICS (4 credits)

An analysis of the rise of social movements in China after the breakdown of the traditional order; the emergence of the Nationalist and Communist regimes and the triumph of the Communists; the political processes of the People's Republic of China, emphasizing the role of elites in policy formation, ideology, mass support, and the exercise of central power. Offered in the fall semester.

PS 339 SINO-SOVIET RELATIONS (4 credits)

The relations between the People's Republic of China and the U.S.S.R., emphasizing the reaction to the Russian experience by the leaders of China and the split between the U.S.S.R. and the People's Republic. Offered in the winter semester.

RUS 365 APPLIED LINGUISTICS OF RUSSIAN (4 credits)

An introduction to modern linguistic insights with particular reference to teaching of the contemporary language; a brief survey of the development of modern Russian. Required for secondary teaching majors. Offered in the winter semester. Identical with LIN 365.

RUS 371, 372 INTRODUCTION TO RUSSIAN LITERATURE (4 credits each)

The study of masterpieces of Russian literature. Classwork and oral and written reports in Russian.

RUS 400 SPECIAL TOPICS IN LANGUAGE (4 credits)

Special problems or topics selected by the instructor. May be repeated for credit.

RUS 426 RUSSIAN POETRY OF THE FIRST HALF OF THE NINETEENTH CENTURY (4 credits)

Major Russian poets from the first part of the nineteenth century: Zhukovsky, Batyushkov, Delvig, Baratynsky, and Yazykov, with emphasis on Pushkin. Conducted in Russian.

RUS 427 RUSSIAN POETRY OF THE SECOND HALF OF THE NINETEENTH CENTURY (4 credits)

Poetry of the second part of the nineteenth century: Tyutchev, Fet, A. Tolstoy, and Nekrasov, with special emphasis on Lermontov and his influence. Conducted in Russian.

RUS 434 RUSSIAN REALISM (4 credits)

Russian realistic novel from 1840 to 1880. Selections from the major novelists. Conducted in Russian.

RUS 435 CHEKHOV AND HIS TIME (4 credits)

Devoted mainly to Chekhov's prose but includes other prose writers of the time such as Garshin, Korolenko, Gorky. Conducted in Russian.

RUS 441 TOLSTOY (4 credits)

Study of Tolstoy's literary and moral development as reflected in his major works. Conducted in Russian.

RUS 442 DOSTOEVSKY (4 credits)

Study of Dostoevsky's evolution as a writer and thinker. Conducted in Russian.

RUS 451 MODERN RUSSIAN PROSE (4 credits)

Selected prose works from the beginning of the twentieth century. Included are works of pre-revolutionary, Soviet, and emigre authors. Conducted in Russian.

RUS 480 SEMINAR IN RUSSIAN LITERATURE (4 credits)

Intensive investigation of some aspect of Russian literature. Offered in alternate years.

RUS 490 INDEPENDENT READING AND RESEARCH (2, 4, or 8 credits)

Directed individual research and reading designed for advanced Russian majors. May be taken for one or more semesters.

SOC 300 SOCIAL STRATIFICATION IN CROSS-CULTURAL PERSPECTIVE (4 credits)

A course which examines the concepts of class, caste, and race in terms of social conflict and social integration. Students will study

these problems in a cross-cultural perspective placing emphasis upon comparative materials.

SPN 373 INTRODUCTION TO SPANISH AMERICAN LITERATURE (4 credits)

A general survey of Spanish American literature complemented with the reading and study of the masterpieces.

SPN 462 SPANISH AMERICAN LITERATURE I (4 credits)

Masterworks of Spanish American literature through the nineteenth century.

SPN 463 SPANISH AMERICAN LITERATURE II (4 credits)

Masterworks of twentieth century Spanish American literature.

AS 500 SPECIAL PROBLEMS IN AREA STUDIES (4 credits)

Interdisciplinary study of a foreign area, or a particular aspect of a foreign area, for which no regular course offerings exist.

AS 581 GRADUATE SEMINAR IN EAST ASIAN STUDIES (4 credits)

Advanced, intensive study of selected topics dealing with East Asia.

AS 582 GRADUATE SEMINAR IN SOUTH ASIAN STUDIES (4 credits)

Advanced, intensive study of selected topics dealing with South Asia.

AS 583 GRADUATE SEMINAR IN SLAVIC STUDIES (4 credits)

Advanced, intensive study of selected topics dealing with the Slavic World.

AS 584 GRADUATE SEMINAR IN AFRICAN STUDIES (4 credits)

Advanced, intensive study of selected topics dealing with Africa.

AS 585 GRADUATE SEMINAR IN LATIN AMERICAN STUDIES (4 credits)

Advanced, intensive study of selected topics dealing with Latin America.

AS 590 GRADUATE READINGS IN AREA STUDIES (2, 4, 6, or 8 credits)

Advanced readings from diverse disciplines with focus on the student's area of specialization in East Asian, South Asian, African, Latin American, Slavic, or comparative studies.

AS 690 THE MASTER'S PROJECT (4 or 8 credits)

An independent research project culminating in a formal paper or a curriculum design.

DEPARTMENT OF BIOLOGICAL SCIENCES

Chairman:

Nalin J. Unakar

Professors:

William C. Forbes, Ph.D., University of Connecticut
V. Everett Kinsey, Ph.D., University of Pittsburgh
Venkat N. Reddy, Ph.D., Fordham University
Reuben Torch, Ph.D., University of Illinois
Walter L. Wilson, Ph.D., University of Pennsylvania

Associate Professors:

Francis M. Butterworth, Ph.D., Northwestern University
John D. Cowlishaw, Ph.D., Pennsylvania State University
Moon J. Pak, Ph.D., University of Minnesota
John R. Reddan, Ph.D., University of Vermont
Michael V. Riley, Ph.D., Liverpool University
Nalin J. Unakar, Ph.D., Brown University

Assistant Professors:

Thomas B. Friedman, Ph.D., University of Michigan
Esther M. Goudsmit, Ph.D., University of Michigan
Egbert W. Henry, Ph.D., The City University of New York
Robert D. Hunter, Ph.D., Syracuse University
Paul A. Ketchum, Ph.D., University of Massachusetts
Charles B. Lindemann, Ph.D., State University of New York at Albany
John T. Romeo, Ph.D., University of Texas at Austin
Arun K. Roy, Ph.D., Wayne State University
Barry S. Winkler, Ph.D., State University of New York at Buffalo

Lecturers:

Philip Clampitt, Ph.D., University of Iowa
James R. Wells, Ph.D., Ohio State University

Adjunct Professor:

Clifford V. Harding, Ph.D., University of Pennsylvania

Visiting Assistant Professor:

Mary Etta Hight, Ph.D., Wayne State University

THE MASTER OF SCIENCE IN BIOLOGY

The program leading to a Master of Science degree in biological sciences is designed to provide students with a broad background in four major areas of biology: biochemistry-biophysics, cell physiology, developmental biology-morphology and genetics. The program offered will satisfy the needs of students seeking further professional training for an advanced degree, for employment in governmental agencies and for students seeking additional training for teaching at the secondary school or two-year college level.

Admission to Course

Admission to the program requires a bachelor's degree or its equivalent from an accredited institution and an undergraduate grade

point average of 3.0 or better (on a 4.0 scale). Exceptions to this requirement may be made if evidence for the capacity for graduate study is provided. Students should have completed not fewer than 20 credits in biology, 8 credits in mathematics, 8 credits in physics and 15 credits in chemistry. Students with deficiencies in these areas may be admitted but will be asked to correct them. Applicants should have transcripts of all college-level work, two letters of reference, and scores on the Graduate Record Examination (the advanced test should be in biology) sent to the Office of Graduate Study.

Requirements for the Degree

The candidate for the degree of Master of Science in biology must complete 36 credits in biology (16 of which must be in courses numbered 500 and above) including at least 4 credits in each of the four *areas*, developmental biology-morphology, biochemistry-bio-physics, cell physiology and genetics. At least 8 credits must be a combination of credits received in graduate laboratory courses and credits received in graduate research (BIO 690). One credit in the biology seminar course and an acceptable thesis are also required. The completed thesis must be approved by a thesis committee appointed by the Departmental Graduate Committee in consultation with the student's thesis adviser. These requirements may be modified for special cases by petitioning the Departmental Graduate Committee. Undergraduate courses which may be used to satisfy the overall credit requirements are listed below. By petition to the Departmental Graduate Committee, a maximum of 10 credits of graduate work may be transferred from another institution.

Research Fields and Facilities

The Department of Biological Sciences is composed of faculty whose research interests are in the areas of cell biology, molecular biology, biochemistry, developmental biology, biophysics, virology, neurophysiology, microbial physiology, genetics, parasitology, ecology, invertebrate physiology and botany. Research in these areas is being conducted at the cellular and molecular level and is supported by adequate equipment, space and library facilities.

These facilities include six teaching laboratories, twelve research laboratories, a large common laboratory for advanced student research, cold rooms, an incubation room, a sterile room, an electron microscopy laboratory, three dark rooms, a radioactive isotope room, preparation and store rooms, an instrument shop, animal quarters, and marine aquaria. Both in functional design and specialized equipment these facilities constitute a major research resource of the University.

In addition, the faculty in the Institute of Biological Sciences is performing basic research on biochemistry and physiology of mammalian vision.

Course Offerings

SELECTED 300 LEVEL COURSES WHICH MAY CARRY GRADUATE LEVEL CREDIT

The following courses may be recommended to the student by the Departmental Graduate Committee.

BIO 301 ECOLOGY (4 credits)

Basic principles of environmental biology, illustrated through field study and having applications to Man.

BIO 302 ECOLOGY LABORATORY (1 credit)

Corequisite: BIO 301

BIO 309 PARASITOLOGY (4 credits)

A survey of parasitic relationships: taxonomy and anatomy of involved organisms, life cycles, nutrition, pathology, immunology, and preventive methods. Opportunity for individual projects.

BIO 310 PARASITOLOGY LABORATORY (1 credit)

Observation and description of type specimens, post mortem of selected animals, histological techniques in slide preparation.

BIO 323 DEVELOPMENTAL BIOLOGY (4 credits)

The principles of embryology and related topics. A consideration of events in the progressive development of the egg into the adult organism. The physiological aspects of morphogenesis, differentiation, growth and regeneration will be included. Offered in the winter semester.

Prerequisites: BIO 113, 114

Corequisite: BIO 324

BIO 324: DEVELOPMENTAL BIOLOGY LABORATORY (1 credit)

To accompany BIO 323. A study of the anatomy of developing vertebrate animals. Individual and group research projects in experimental morphogenesis. Offered in the winter semester.

Corequisite: BIO 323

BIO 331 MICROBIOLOGY (4 credits)

A discussion of the classification, morphology and physiology of microorganisms.

Prerequisite: BIO 113, and one year of Chemistry

BIO 341 GENETICS (4 credits)

The physical and chemical basis of inheritance. Selected topics in human genetics, microbial genetics, biochemical genetics, and cytogenetics.

Prerequisite: BIO 113

BIO 342 GENETICS LABORATORY (1 credit)

Corequisite: BIO 341

BIO 343 AQUATIC BIOLOGY (4 credits)

A general study of energy flow and biomass production up the trophic series, including energy transfer and limiting factors at each level. The finite nature of aquatic resources and their exploitation in relation to the future protein requirements of man will be explained and examined.

Prerequisites: BIO 111, 112, 113, 114

BIO 344 AQUATIC BIOLOGY LABORATORY (1 credit)

Corequisite: BIO 343

BIO 350 PHYSIOLOGY OF THE CENTRAL NERVOUS SYSTEM (2 credits)

A course on the functional organization and integrative operation of the central nervous system. Topics include neuronal activity, synaptic transmission, regional network properties, organization of cerebral function, sensation (including special senses) and control of motor activity.

Prerequisite: Introductory Biology Course or Equivalent

Upper Level and Graduate Courses

(One credit hour is equal to one semester hour.)

BIO 403 PROTOZOOLOGY (4 credits)

Recognition, morphology, reproduction, and physiology of the more important taxonomic groups of the protozoa.

BIO 407 CELLULAR BIOCHEMISTRY (4 credits)

An advanced level discussion of the cellular function in the perspective of the recent developments in molecular biology. The topics to be covered include macromolecular chemistry, enzymology, metabolic interrelationships, subcellular organelles, protein and nucleic acid biosynthesis and cellular control mechanisms. Offered in the fall semester.

Prerequisites: BIO 225, CHM 204, PHY 102

BIO 408 CELLULAR BIOCHEMISTRY LABORATORY (1 credit)

An introduction to modern research techniques in biochemistry. The laboratory work will include: different chromatographic techniques (paper, column, thin layers, etc.), electrophoresis and immunoelectrophoresis, enzyme chemistry (purification and kinetic analysis), ultracentrifugation and cell fractionation, isolation and density gradient analysis of the nucleic acids. Offered in the fall semester.

Corequisite: BIO 407

BIO 411 EXPERIMENTAL EMBRYOLOGY (4 credits)

Lectures and student seminars on current topics in gametogenesis, fertilization and development. Emphasis is on the critical evaluation of current and classical publication. Offered in the winter semester.

Prerequisites: BIO 323 and permission of Instructor

BIO 412 LABORATORY IN EXPERIMENTAL EMBRYOLOGY (2 credits)

The development of a variety of living embryos will be followed. When the stages of normal development have been observed, an experimental analysis of some aspect of embryogenesis will be undertaken.

Corequisite: BIO 411

BIO 415 DIFFERENTIATION (4 credits)

A consideration of the theories relating to the control of differentiation and development.

Prerequisite: BIO 323

BIO 425 BIOPHYSICS (4 credits)

An examination of the relationship of biology to the other sciences. Quantitative analysis of living systems will be emphasized, particularly at the cellular and sub-cellular levels. Offered in the winter semester.

Prerequisites: BIO 225 or equivalent, calculus, organic chemistry, and general physics.

BIO 426 BIOPHYSICS LABORATORY (1 credit)

Corequisite: BIO 425

BIO 429 CYTOCHEMISTRY (4 credits)

A survey of techniques currently used in microscopy to analyze the distribution and quantity of specific chemicals within cells and their organelles. Techniques included are: specific staining reactions, enzyme digestion, metabolic inhibition, and autoradiography.

Prerequisites: BIO 223, 224 and permission of the Instructor

BIO 430 CYTOCHEMISTRY LABORATORY (2 credits)

Individual research projects employing cytochemical techniques to study and compare and chemical compositions of several types of cells.

Corequisite: BIO 429

BIO 435 DEVELOPMENTAL GENETICS (4 credits)

An integrated discussion of the concepts of biochemical genetics derived from microbial systems, and their application to the problems of development in multicellular organisms. Offered in the fall semester.

Prerequisite: BIO 341 and 342, BIO 323, 225 and 226 or permission of the Instructor.

BIO 436 DEVELOPMENTAL GENETICS LABORATORY (1 credit)

Corequisite: BIO 435

BIO 437 VIROLOGY (4 credits)

Molecular biology of viruses, predominantly bacterial.

Prerequisite: BIO 225, 331, or 341

BIO 438 VIROLOGY LABORATORY (1 credit)

Corequisite: BIO 437

BIO 441 MICROBIAL GENETICS (4 credits)

A discussion of the genetics of microbial systems, including molds, bacteria, protozoa, and viruses.

Prerequisites: BIO 331 and BIO 341

BIO 442 MICROBIAL GENETICS LABORATORY (1 credit)

Corequisite: BIO 441

BIO 445 ULTRASTRUCTURE (4 credits)

A consideration of the fine structure of cells and cell products as revealed by electron microscopy and other procedures. Offered in the winter semester.

Prerequisite: BIO 223 and permission of the Instructor.

BIO 446 ULTRASTRUCTURE LABORATORY (2 credits)

Corequisite: BIO 445

BIO 463 CELL BIOLOGY (4 credits)

Prerequisites: BIO 223 and permission of the Instructor.

BIO 464 CELL BIOLOGY LABORATORY (1 credit)

Corequisite: BIO 463

BIO 471 ADVANCED PHYSIOLOGY-NERVE (4 credits)

Review and analysis of the modern concepts of membrane excitation phenomena of nerve and synapse. Electrophysiological phenomena discussed mostly at cellular and molecular levels. Offered in the fall semester in alternate years.

Prerequisites: BIO 221 and permission of Instructor.

BIO 472 ADVANCED PHYSIOLOGY LABORATORY (1 credit)

An introduction to research techniques in electrophysiology. Work will include: Use of oscilloscope, amplifiers, and stimulator; extracellular potential recording technique; microelectrode technique.

Corequisite: BIO 471.

BIO 473 ADVANCED PHYSIOLOGY-MUSCLE (4 credits)

Review and analysis of the modern concepts of muscular activity and molecular mechanism of contraction. The discussions will include the ultrastructural correlation of muscle function and mechanics, biochemical approaches to elucidate energetics of muscle contraction, theories of molecular basis of muscular contraction. Offered in the fall semester in alternate years.

Prerequisites: BIO 221 and permission of the Instructor.

BIO 474 ADVANCED PHYSIOLOGY LABORATORY (1 credit)

An introduction to research techniques in muscle physiology. Work will include: neuromuscular transmission study; isometric force measurements; isotonic level design problems; length-tension, force-velocity relations; stress-strain relations of series elastic component; contractile properties of isolated actomyosin system and glycerinated muscle fiber.

Corequisite: BIO 473.

BIO 511 ADVANCED TOPICS IN CELLULAR BIOCHEMISTRY AND BIOPHYSICS (4 credits)

A discussion and lecture course offered by faculty members with research interests in biophysics and biochemistry. Topics will be announced.

BIO 512 GRADUATE TUTORIAL LAB IN CELLULAR BIOCHEMISTRY AND BIOPHYSICS (2 credits)

Techniques course offered to small groups of students in faculty research laboratories.

Corequisite: BIO 511.

BIO 513 ADVANCED TOPICS IN CELL PHYSIOLOGY (4 credits)

A discussion and lecture course offered by faculty members with research interests in cell physiology. Topics will be announced.

BIO 514 GRADUATE TUTORIAL LAB IN CELL PHYSIOLOGY (2 credits)

Techniques course offered to small groups of students in faculty research laboratories.

Corequisite: BIO 513.

BIO 515 ADVANCED TOPICS IN DEVELOPMENTAL BIOLOGY AND MORPHOLOGY (4 credits)

A discussion and lecture course offered by faculty members with research interests in developmental biology and morphology. Topics will be announced.

BIO 516 GRADUATE TUTORIAL LAB IN DEVELOPMENTAL BIOLOGY AND MORPHOLOGY (2 credits)

Techniques course offered to small groups of students in faculty research laboratories.

Corequisite: BIO 515.

BIO 517 ADVANCED TOPICS IN GENETICS (4 credits)

A discussion and lecture course offered by faculty members with research interests in genetics. Topics will be announced.

BIO 518 GRADUATE TUTORIAL LAB IN GENETICS (2 credits)

Techniques course offered to small groups of students in faculty research laboratories.

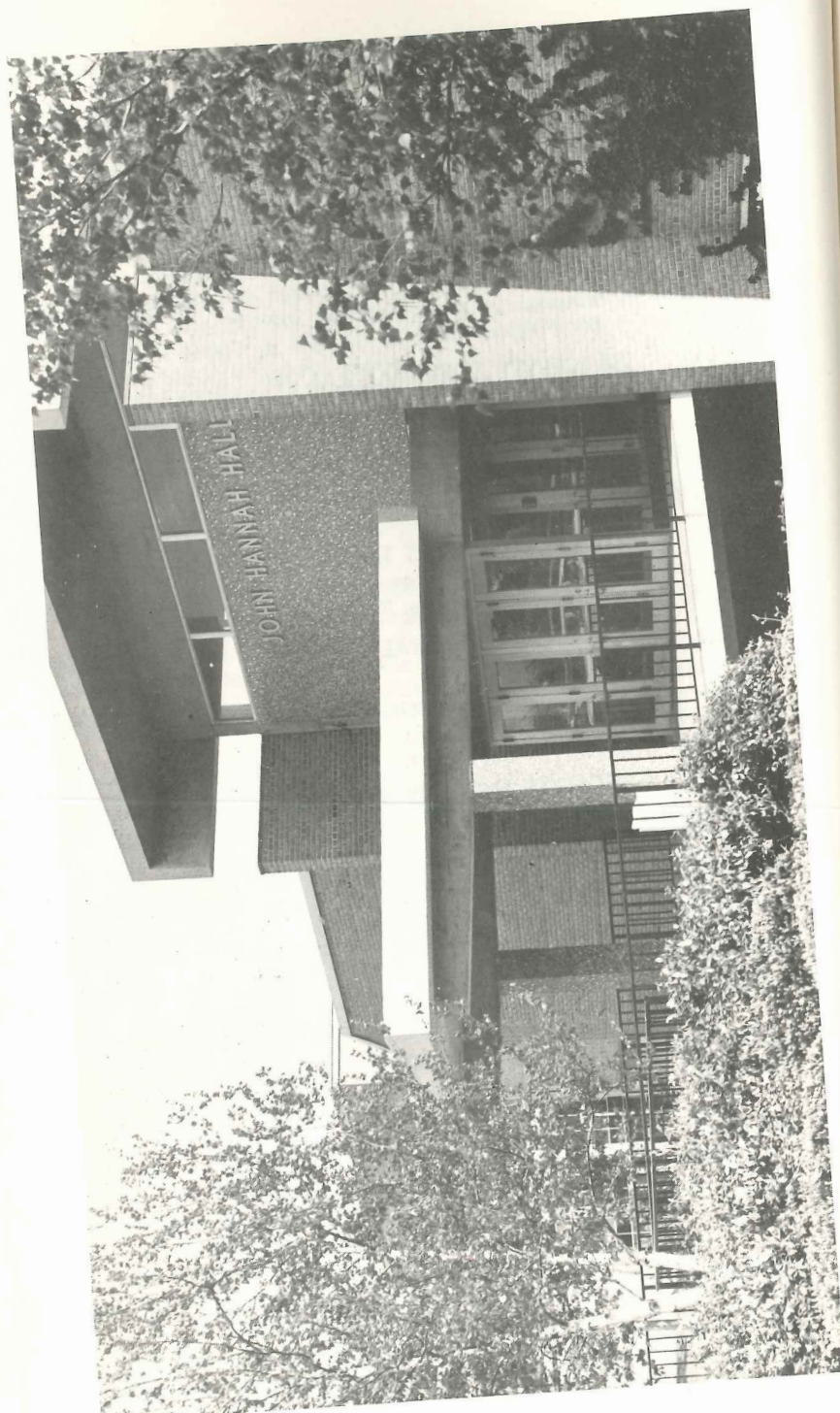
Corequisite: BIO 517.

BIO 611 GRADUATE BIOLOGY SEMINAR (1 credit)

Graduate student presentation of scientific data dealing with biological problems.

BIO 690 GRADUATE RESEARCH (4 or 8 credits)

Research credits limited to graduate students in the biological sciences. This research course will serve as the basic course leading to the preparation of a thesis.



DEPARTMENT OF CHEMISTRY

Chairman:

Paul Tomboulia

Professors:

Gottfried Brieger, Ph.D., University of Wisconsin
 Kenneth M. Harmon, Ph.D., University of Washington
 Lewis N. Pino, Ph.D., University of Buffalo
 Paul Tomboulia, Ph.D., University of Illinois

Associate Professors:

Julien Genyca, Ph.D., Cornell University
 Steven R. Miller, Ph.D., Massachusetts Institute of Technology
 Frederick W. Obear, Ph.D., University of New Hampshire
 Joel W. Russell, Ph.D., University of California (Berkeley)
 Parbury P. Schmidt, Ph.D., University of Michigan
 Robert L. Stern, Ph.D., John Hopkins University
 Robert C. Taylor, Ph.D., Princeton University

Assistant Professors:

Michael D. Sevilla, Ph.D., University of Washington
 Christine S. Sloane, Ph.D., Massachusetts Institute of Technology
 Donald C. Young, Ph.D., University of North Carolina

THE MASTER OF SCIENCE IN CHEMISTRY

The Master of Science in chemistry can be viewed as either a terminal or an intermediate degree. By itself it serves as preparation for employment in chemical and related industries, a wide range of government agencies, and two-year college teaching. It also prepares the student for further study towards advanced degrees in chemistry, oceanography, medicine, environmental sciences, and related fields. The program is designed especially for full-time students, but provision is made for part-time students who wish to pursue an advanced degree and can arrange to include the research component during the daytime. All graduate students must receive approval of the departmental graduate program adviser before enrolling in courses.

Admission to Course

An applicant for admission to regular status in the Master of Science program should have received a bachelor's degree within the past five years from an accredited institution. Students should have completed at least 36 credits in chemistry (including all major areas), 12 credits in mathematics (calculus and above), and 8 credits in physics. Students with deficiencies in these areas may be asked to correct these deficiencies, and their graduation may thus be delayed. A grade point average of at least 2.75 (on a 4.0 scale) in these courses is usually required, but applicants will be considered on their individual merits upon recommendation of persons familiar with the applicant's academic background. The Graduate Record Examination may be required, especially if the applicant does not hold an American degree.

By petition to the Department, a maximum of 10 credits of graduate work may be transferred from another institution.

Applicants who do not meet the above requirements may be admitted (1) with probationary status, (2) into special graduate status, or (3) into post baccalaureate status.

Requirements for the Degree

The candidate for the degree of Master of Science in chemistry ordinarily must complete the following minimum requirements: 32 credits in courses carrying graduate credit, of which 26 credits must be in chemistry. Of these 26 credits, 16 must be from four of the following areas: biochemistry, inorganic chemistry, organic chemistry, physical chemistry, environmental studies, and analytical chemistry. (Permission of the graduate program adviser is required if 300-level courses are to be used.) Of the remaining 10 credits in chemistry, a minimum of 8 credits must be in CHM 690. The candidate must have demonstrated accomplishment in research and must have a thesis approved by a departmental committee prior to receiving the degree. Since the degree is awarded for the attainment of a level of proficiency and maturity, no minimum amount of time can be specified for the degree program.

Research Fields and Facilities

Because graduate work in chemistry involves research and presentation of a master's thesis, the programs, facilities, and staff available are important. The various current research activities of the staff include high-resolution infrared spectroscopy, photochemistry of natural products, insect biochemistry, electron spin resonance of solid-state and biological systems, microwave spectroscopy, quantum mechanical models, organoboranes, ionic aromatic polymers, atmospheric chemistry, gas reaction kinetics, molecular structure and dynamics, Fourier spectroscopy, chromatographic pollutant analysis, limnological chemistry, instrumentation design, theoretical quantum mechanics, non-equilibrium statistical mechanics, lanthanide shift reagents, organophosphorus chemistry, coordination chemistry, kinetics and thermodynamics of rearrangement processes in solution, electrochemistry, and relaxation techniques for slow proton transfers.

Among research facilities available to chemistry students are electronic computers, high- and low-resolution infrared spectrophotometers, analytical and preparative gas-liquid chromatographs including fraction collectors, catalytic hydrogenation equipment, a nuclear magnetic resonance spectrometer, radio-chemical counting equipment, a scintillation counter, polarographic and automatic titration equipment, an electron spin resonance spectrometer, spinning-band fractionating columns, variety of high- and low-resolution visible and ultraviolet spectrophotometers, a high-resolution far-infrared interferometer, an ultracentrifuge, fluorometric and nephelometric equipment, and a large amount of electronic and vacuum instrumentation. Nearby facilities include two digital computers, an electron microscope, and a helium leak detector.

Course Offerings

(One credit hour is equal to one semester hour.)
(300-Level Courses May Carry Graduate Credit only with Permission of Adviser.)

CHM 345 PHYSICAL CHEMISTRY (4 credits)

Physical chemistry of microscopic systems: elementary quantum

chemistry, bonding theories, introductory statistical mechanics.

Prerequisites: CHM 205 or 344, MTH 254.

CHM 348 PHYSICAL CHEMISTRY LABORATORY (2 credits)

Prerequisites: CHM 344, PHY 158.

CHM 351 BIOCHEMISTRY (4 credits)

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

Prerequisite or corequisite: CHM 235 or 204.

CHM 357 BIOCHEMISTRY LABORATORY (2 credits)

Prerequisite or corequisite: CHM 351.

CHM 372 AIR CHEMISTRY (4 credits)

A technical evaluation of the nature and composition of the earth's atmosphere, both in its natural state and as it has been affected by man. Some discussion of air pollution control will be included. Identical with ENV 372.

Prerequisite: CHM 203 and 305.

CHM 373 AQUATIC CHEMISTRY (4 credits)

A technical introduction to the nature and composition of all types and bodies of water, including streams, rivers, lakes, and oceans. Some discussion of water pollution control will be included. Identical with ENV 373.

Prerequisite: CHM 203 and 305.

CHM 405 SELECTED TOPICS (1, 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 217.

CHM 426 INSTRUMENTATION AND ELECTROANALYTICAL CHEMISTRY (3 credits)

Basic electronics, passive networks, Laplace Transforms, operational amplifier circuits, building of instruments with emphasis on electroanalytical instrumentation. Lectures and laboratory.

Prerequisite: CHM 217 or equivalent, PHY 158; pre- or corequisite CHM 344.

CHM 434 ADVANCED ORGANIC CHEMISTRY (4 credits)

Discussion of the various aspects of modern synthetic methods, stereochemistry, and reaction mechanisms; selected special topics.

Prerequisite: CHM 204 or 235.

CHM 444 ADVANCED PHYSICAL CHEMISTRY (4 credits)

Application of quantum mechanics and statistical mechanics to

chemical kinetics, molecular structure, and molecular spectroscopy.
Prerequisite: CHM 345.

CHM 448 SPECTROSCOPY LABORATORY (2 credits)

Experimental techniques of spectroscopy: infrared, ultraviolet, nuclear magnetic resonance, electron spin resonance, mass spectroscopy.

Prerequisite or corequisite: CHM 444.

CHM 452 ADVANCED BIOCHEMISTRY (4 credits)

Topics in intermediary metabolism, cellular regulation, and molecular genetics.

Prerequisite: CHM 351 or BIO 407.

CHM 487 ADVANCED PREPARATIONS (2 or 4 credits)

Specialized laboratory work in selected areas emphasizing advanced techniques.

Prerequisite: Permission of the instructor is required prior to registration.

Chemistry courses on the 500-level are graduate level courses available to well-prepared undergraduate students with permission of the department. These courses may be offered as reading courses on a tutorial basis or as small lecture courses.

CHM 512, 513 TOPICS IN INORGANIC CHEMISTRY (4 credits each)

Advanced treatment of selected topics of inorganic chemistry.

Prerequisite: CHM 413 or equivalent.

CHM 523, 524 TOPICS IN ANALYTICAL CHEMISTRY (4 credits each)

Advanced treatment of selected topics of current analytical chemistry such as separation methods, instrumentation, electrochemistry.

Prerequisite: CHM 422 or equivalent.

CHM 531, 532, 533 TOPICS IN ORGANIC CHEMISTRY (4 credits each)

Advanced treatment of selected special topics: natural products, organometallics, reaction mechanisms, synthesis.

Prerequisite: CHM 434 or equivalent.

CHM 543, 544 TOPICS IN PHYSICAL CHEMISTRY (4 credits each)

Special topics in physical chemistry such as quantum mechanics, statistical mechanics and thermodynamics, kinetics, group theory.

Prerequisite: CHM 444 or equivalent.

CHM 552, 553 TOPICS IN BIOCHEMISTRY (4 credits each)

Advanced treatment of selected topics in biochemistry. This course is usually conducted as tutorial with topics chosen according to the interests and backgrounds of the students.

Prerequisite: CHM 452 or equivalent.

CHM 690 RESEARCH (1, 2, 4, 6, or 8 credits)

Prerequisite: Permission of the Department.

DEPARTMENT OF ENGLISH

Chairman:

Joseph W. DeMent

Professors:

Maurice F. Brown, Ph.D., Harvard University
John P. Cutts, Ph.D., University of Birmingham
Joseph W. DeMent, Ph.D., Indiana University
Peter G. Evarts, Ph.D., Wayne State University
Thomas Fitzsimmons, M.A., Columbia University
William Schwab, Ph.D., University of Wisconsin
Gertrude M. White, Ph.D., University of Chicago

Associate Professors:

Herbert Appleman, M.A., Columbia University
James F. Hoyle, Ph.D., Princeton University
David W. Mascitelli, Ph.D., Duke University
Donald E. Morse, Ph.D., University of Connecticut
Joan G. Rosen, M.A., Wayne State University

Assistant Professors:

Charles M. Broh, Ph.D., Case Western Reserve University
Robert L. Donald, M.A., University of Detroit
Jane Eberwein, Ph.D., Brown University
Robert T. Eberwein, Ph.D., Wayne State University
Daniel H. Fullmer, Ph.D., University of Michigan
Nigel Hampton, Ph.D., University of Connecticut
William F. Horwath, Ph.D., University of Michigan
Beverly F. Jones, Ph.D., University of Michigan
Brian F. Murphy, A.M., Harvard University
Helen J. Schwartz, Ph.D., University of Washington

Instructors:

Daniel P. Armstrong, M.A., Indiana University
James E. Hart, B.A., St. Francis College

The Department of English offers programs leading to the degrees of Master of Arts in English and Master of Arts in Teaching in English. The latter program is jointly sponsored by the College of Arts and Sciences and the School of Education.

Admission to Course

Admission to course in either of the department's advanced degree programs is selective. Chief qualifications are the degree of Bachelor of Arts from an accredited institution, academic ability as indicated by past record, and interest in continued study of letters. An English major, as such, is not regarded as indispensable background, but a substantial number of undergraduate English courses will normally be expected to appear in the applicant's record. Evidence of additional reading in the literature of history, philosophy, and theology is welcome; prior study in linguistics and philology is also recommended.

All entering graduate students must meet minimal University graduate admission standards. All will be enrolled conditionally until such time as they are admitted by the department to degree candidacy. Consideration for candidacy comes after the student has

completed sixteen hours of graduate work successfully at Oakland University including at least eight credits in the Department of English. Normally, all courses offered toward candidacy must be completed with grades of 3.0 or better. The M.A.T. candidate must also receive the approval of the School of Education before candidacy is granted.

When students of specially recommended ability, but with insufficient background—in extent or balance of previous studies—are admitted, they will be advised concerning improvement of their preparation and will usually be asked to take an appropriate number of departmental undergraduate courses before commencing graduate work. Their degree programs, accordingly, may require a proportionately longer period to complete.

Students in either the M.A. or M.A.T. program whose undergraduate records show no course in English language or linguistics may be asked to include one such course among their graduate undertakings.

Enrollment for all courses is subject to the approval in writing of a graduate English adviser.

THE MASTER OF ARTS IN ENGLISH

The program leading to the degree of Master of Arts in English has been designed to provide training for students interested in increasing their proficiency in the study of English and American language and literature.

The basic curriculum is rather prescriptive, directing the student's attention not so much to literary materials or specialization in an historical period, but to major critical approaches. Opportunity is offered for scholarly, pedagogical and creative application of basic approaches to literature and language. The program is of use to those whose eventual goal is the Ph.D. degree, but it is primarily directed to the needs of teachers of English in advanced high school classes and to those preparing for teaching in junior and community colleges.

Requirements for the Degree

Nine courses (36 credits) are required, two of which must be 600-level courses in English. The seven additional courses are to be chosen in consultation with the student's program adviser. Within the 36 credits required for the degree, a student may be permitted to take one course in a cognate liberal arts field, or ENG 510 in lieu of a cognate, but only with specific approval of the adviser. Candidates for the degree will be expected to show competence in the reading of a second language (ancient or modern) by examination early in the program. Language competency examinations will normally be given in mid-November and mid-March. Students will not be allowed to continue course work beyond 16 credits until they have satisfied the language requirement. (See also the Master of Arts with English language concentration below.)

THE MASTER OF ARTS WITH ENGLISH LANGUAGE CONCENTRATION

The program leading to the degree of Master of Arts with English language concentration is not a separate degree program but a concentration within the existing Master of Arts in English program. The Master of Arts with English language concentration

is provided for those students who wish to study linguistic theory, and the structure and history of the English language on the graduate level.

Admission to course

Any students duly admitted into the M.A. program may, in consultation with their advisers, arrange a program with English language concentration. The only added prerequisite for this program is any one of the following three courses: ENG 376, History of the English Language; ENG 377, Modern English Grammar; or ENG 382, Old English. The equivalent of any one of these will also be accepted.

Requirements for the Degree

Nine courses (36 credits) are required, six of which are specified in the normal program: the two undergraduate courses from the above list (ENG 376, 377, 382) which were not taken as prerequisites; ENG 534, Language History; ENG 642, Studies in Old and Middle English Literature; ENG 647, Studies in the Structure of English; and ENG 690, The Master's Project. The other three courses will be elected from graduate offerings in English literature. The standard program may be modified for an individual student depending on his background and interests. The language requirement for the Master of Arts in English is also applicable to this concentration.

THE MASTER OF ARTS IN TEACHING IN ENGLISH

The program leading to the degree of Master of Arts in Teaching in English is designed more particularly 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 College of Arts and Sciences and the School of Education.

Requirements for the Degree

Nine courses (36 credits) are required, five of which are specified: ENG 510, two 600-level courses in English; one course chosen from the following group of four alternates: ED 601, ED 602, ED 603, or ED 604, described on page 54, and one course from the following group of two: PSY 510 or PSY 512, described on page 78. The remaining four courses in English are to be chosen in consultation with the student's program adviser.

CLASSIFICATION OF COURSE OFFERINGS

The graduate program of the Department of English offers four kinds of courses:

(1) Undergraduate Courses (300 and 400 levels)

The student may take a maximum of two undergraduate courses to be chosen from regular departmental 300 and 400 level offerings. Such courses are deemed useful principally in preparing students to take seminars in areas of language and literature for which they are not yet adequately trained. No more than five graduate students may enroll in any 300 or 400 level course.

(2) Core Course (500 level)

Core courses are designed to familiarize the student with principal approaches to language and literature and with methods and tools appropriate to those approaches. The department considers these courses to be central to the graduate program and recommends

that the student take at least three of them. They should be considered as helpful aids in coping with the more specialized work of the seminars. Each of these courses will be offered at least once during the year. (ENG 500, 510, and 597, as noted below in the list of course offerings, are specialized courses, not core courses.)

(3) Seminars and the Master's Project (600 level)

(a) Seminars

The purpose of the graduate seminar is to allow the student to do independent work in an area in which the instructor has special sophistication, at the same time to gain criticism and support from other students working in the same area. Classes will consist mainly of the reading and discussion of papers prepared by the students on topics specified by the instructor. The instructor will prescribe the particular subject matter of each course during any given term. First-term students may not enroll in a seminar without permission of the Department Committee on Graduate Programs. Seminars are limited to twelve students.

(b) ENG 690 The Master's Project

ENG 690 involves completion of a modest project of creative, scholarly, or pedagogical nature, proposed initially by the candidate. Any written work to be submitted in partial or total fulfillment of a project should not exceed 7,500 words. Projects normally arise out of graduate course work, and candidates are advised to register for ENG 690 at any time after the completion of 12 credits. The course is open only to students who can propose an independent project and have made arrangements with a member of the department interested in supervising it. An application form for ENG 690 is available in the department office. It must be used by the student in submitting a conspectus of the project and seeking approval to proceed.

(4) Summer Institutes

Concentrated four-week institutes in Shakespeare, linguistics, and other topics of interest to high school teachers and post-baccalaureate students are offered in summer session. They are designed as refresher courses or as introductions to topics of particular contemporary concern. Institutes grant four hours of graduate credit and are usually graded S/N. Students may not offer more than four hours of work in institutes toward fulfillment of requirements for advanced degrees except by permission of the Graduate Committee of the department. Candidates for degrees must consult with their advisers before electing summer institutes.

Cognate Courses (M.A. Program)

Students in the M.A. program may, with the written approval of the chairman of the Graduate Programs Committee, offer one course from another department of this University for credit toward their degrees. Such a course should be advanced work in a field relevant to the student's special interests in English language or literature.

Course Offerings

(One credit hour is equal to one semester hour.)

ENG 500 ADVANCED TOPICS IN LITERATURE (4 credits) AND LANGUAGE

Special topics and problems as selected by the instructor. Not a core course.

ENG 510 LITERATURE AND COMPOSITION (4 credits)

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 criticism of writing. Designed for the teacher of English language and literature. Required of M.A.T. candidates. Not a core course.

ENG 515 SHAKESPEARE INSTITUTE (4 credits)

An intensive four-week consideration of Shakespeare's theatre and selected plays directed to the needs of secondary school teachers. Lectures, discussions, workshops, and trips to Stratford productions.

ENG 533 FORMAL ANALYSIS (4 credits)

An intensive study of approaches to specific works of literature in and of themselves and an examination of techniques appropriate to those approaches.

ENG 534 LANGUAGE HISTORY (4 credits)

An intensive study of the development of standard English through an examination of texts that are representative of Early Modern English, Middle English, and Old English.

ENG 541, 542 LITERARY HISTORY (4 credits each)

Work in a different literary period each semester with emphasis on concepts, approaches and methodology appropriate to the literary historian. Literature in historical perspective and in cultural and social contexts. Either semester may be elected independently.

ENG 561, 562 LITERARY KINDS (4 credits each)

Study in each semester of a single genre (such as novel, lyric, or drama) or mode (tragedy, comedy, pastoral). Consideration of similarities and differences among individual works, and of the relationship of the kind under discussion to the body of literature as a whole. Either semester may be elected independently.

ENG 597 APPRENTICE COLLEGE TEACHING (4 credits)

An introduction to teaching English at the college level. Internship with assigned professor in a course offered at Oakland or a cooperating community college. To be arranged in the semester preceding that in which the course is taken. By permission only. Not a core course.

ENG 600 STUDIES IN LANGUAGE AND LITERATURE (4 credits)

Special topics and problems as selected by the instructor.

ENG 640 STUDIES IN AMERICAN LITERATURE (4 credits)

ENG 641 STUDIES IN AMERICAN LITERATURE (4 credits)

- ENG 642 STUDIES IN OLD AND MIDDLE ENGLISH LITERATURE (4 credits)
- ENG 643 STUDIES IN RENAISSANCE LITERATURE (4 credits)
- ENG 644 STUDIES IN 18th CENTURY LITERATURE (4 credits)
- ENG 645 STUDIES IN 19th CENTURY LITERATURE (4 credits)
- ENG 646 STUDIES IN MODERN LITERATURE (4 credits)
- ENG 647 STUDIES IN THE STRUCTURE OF ENGLISH (4 credits)
- ENG 648 STUDIES IN LITERARY THEORY (4 credits)
- ENG 690 THE MASTER'S PROJECT (4 credits)

Completion of a modest project of a creative, scholarly, or pedagogical nature proposed by the degree candidate.

Prerequisites: Permission of the Committee on Graduate Programs.

Related Courses

- 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.

- ED 602 PHILOSOPHY OF EDUCATION (4 credits)

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

- ED 603 CROSS-CULTURAL STUDIES IN EDUCATION (4 credits)

This course offers an opportunity for study of educational systems other than that of the United States. Special attention is given to education's relationship to language policy, national unification, and economic development. Europe, Asia, and Africa provide the setting for consideration of the instrumental role schools play in defining equal opportunity and individual's subsequent life-chances in their society.

- ED 604 SOCIOLOGY OF EDUCATION (4 credits)

A study of social and cultural forces and their impact on the organization and practices of schools. An investigation of social dynamics within the schools and the impact of schools on other institutions of society.

DEPARTMENT OF HISTORY

Chairman:

Melvin Chernó

Professors:

Charles W. Akers, Ph.D., Boston University
 V. John Barnard, Ph.D., University of Chicago
 Richard M. Erace, Ph.D., University of California (Berkeley)
 Melvin Chernó, Ph.D., Stanford University
 Robert C. Howes, Ph.D., Cornell University
 George T. Matthews, Ph.D., Columbia University
 W. Patrick Strauss, Ph.D., Columbia University
 S. Bernard Thomas, Ph.D., Columbia University

Associate Professors:

DeWitt S. Dykes, Jr., M.A., University of Michigan
 Leonardas V. Gerulaitis, Ph.D., University of Michigan
 Gerald C. Heberle, Ph.D., Ohio State University
 Harold G. Lawrence, M.Ed., Wayne State University
 Anne H. Tripp, Ph.D., University of Michigan
 Richard P. Tucker, Ph.D., Harvard University

Assistant Professors:

James D. Graham, Ph.D., Northwestern University
 Mary C. Karasch, Ph.D., University of Wisconsin
 Joseph A. Klaitz, Ph.D., University of Minnesota
 Roy A. Kotlynek, Ph.D., Northwestern University
 Robert J. Krompart, Ph.D., University of California (Berkeley)
 Lawrence D. Olson, Ph.D., Indiana University
 Carl R. Osthaus, Ph.D., University of Chicago
 Colin A. Palmer, Ph.D., University of Wisconsin
 I. Michael Solomon, Ph.D., Columbia University

THE MASTER OF ARTS IN HISTORY

This program may serve either as a terminal degree or as a bridge to more advanced study and is designed to accommodate both full and part time students. In addition to a complete day time schedule, late afternoon and evening courses are also available.

Admission to Course

The department will consider applicants who hold the degree of Bachelor of Arts or Bachelor of Science from an accredited institution and whose credentials, including transcripts and letters of recommendation, give evidence of academic distinction. An undergraduate major in history is not an absolute requirement for admission, but a significant number of undergraduate courses in history should appear on the applicant's record.

A grade point average of 3.0 (on a 4.0 scale) in undergraduate history courses and a GPA of 2.0 in all undergraduate work will ordinarily be considered the minimum standards for admission. These minima may be waived in individual cases; the department, at its discretion, may admit students of superior promise but deficient preparation with the provision that such students make good their deficiencies before commencing graduate work.

Students may be admitted in any of the four terms of the academic year.

Requirements for the Degree

The degree will be awarded on successful completion of 38 credits—36 in nine graduate courses and two additional credits for completion of a comprehensive examination in the student's major field. At the time of admission, each student will choose a major field from among the following areas of historical study:

United States;

Europe (including Great Britain and Russia);

Africa, East and South Asia, and Latin America.

At least 20 credits (5 courses) of the student's work must be in the major field.

Each student must complete at least two colloquia (HST 601-606) and two research seminars (HST 691-696). At least one of the colloquia and at least one of the research seminars must be in the student's major field. Both the colloquia and the seminar courses will be limited in size, thereby affording opportunity for discussion with fellow students and the instructor. Successful completion of the written comprehensive examination on the student's major field (HST 600) will be the final step in the degree program.

The department imposes no general foreign language study requirement for the master's degree. However, the study of certain fields may necessitate reading knowledge of a foreign language. Students will confer with their advisers to determine the adequacy of their linguistic preparation for specific courses and programs.

Subject to approval by the departmental Graduate Committee, as many as twelve credits toward the degree may come from work outside the Department of History. The credits may consist of work in graduate courses in other departments at Oakland University or from graduate history courses at other institutions.

Course Offerings

HST 502 HISTORY OF THE AMERICAN WORKER IN THE TWENTIETH CENTURY (4 credits)

Study of the composition of the work force, the economic and social conditions of work, the rise of organized labor, the political programs and activities of workers and their responses to new technology and new economic structures, and the problems of the contemporary worker.

HST 506 COLONIAL AND REVOLUTIONARY AMERICA (4 credits)

The transplantation of European society to continental North America; the subsequent development of political, economic and social institutions in the colonies; the Anglo-French struggle for the continent; and the American Revolution.

HST 507 AMERICAN RELIGIOUS HISTORY (4 credits)

A study of the religious history of the American people with an emphasis on social aspects. Within the general outline of chronological development, attention is given to such selected topics as religious elements in immigration, the separation of church and state, denominationalism and sectarianism, religion and nationalism, religious leadership, and religion as an influence in social change. Offered each winter.

HST 510 THE YOUNG REPUBLIC AND THE AGE OF JACKSON, 1787-1850 (4 credits)

The making of the Constitution, the social, political and economic development of the new nation and the subsequent forces affecting expansion, social protest and sectionalism to 1850.

HST 512 THE CIVIL WAR AND RECONSTRUCTION, 1850-1876 (4 credits)

The origins of secession, the wartime problems of the Union and the Confederacy, the principal military campaigns, the Reconstruction Era and the creation of a new Union, and the significance of the Civil War and Reconstruction in American history.

HST 513 AMERICAN HISTORY, 1876-1900 (4 credits)

The New South, industrial consolidation, the origins of the modern labor movement, the rise of the city, immigration, agrarian protest movements, the businessman's philosophy, and the challenge to laissez faire.

HST 514 AMERICAN HISTORY, 1900-1928 (4 credits)

The social, political, and economic developments in the United States during the progressive era and the decade of the 1920's.

HST 515 AMERICAN HISTORY SINCE 1928 (4 credits)

The myth of the New Era, the social and political impact of the Great Depression, New Deal programs and radical alternatives, the isolationist-internationalist debate, modern Republicanism, and the New Frontier.

HST 516 AMERICAN INTELLECTUAL HISTORY TO 1860 (4 credits)

The intellectual and cultural history of the American people from the colonial period to the Civil War.

HST 517 AMERICAN INTELLECTUAL HISTORY SINCE 1860 (4 credits)

Major intellectual and cultural trends in the United States from the Civil War to the present.

HST 519 HISTORY OF THE AMERICAN SOUTH (4 credits)

The South from colonial times to the 1960's, emphasizing the transition from the agrarian, slave South of the antebellum period to the modern South of the twentieth century.

HST 520 U. S. DIPLOMATIC HISTORY TO 1898 (4 credits)

The origins, formulation, and development of American foreign policy and diplomacy from the Revolution to the Spanish-American War, including such topics as neutrality and isolationism, the Monroe Doctrine, Manifest Destiny, and the Civil War.

HST 521 U. S. DIPLOMATIC HISTORY SINCE 1898 (4 credits)

American foreign policy and diplomacy from the Spanish-American War to the present, including such topics as American imperialism, Caribbean and Far Eastern policies, involvement in the world wars and the Cold War, and nuclear diplomacy.

HST 522 THE SOCIAL HISTORY OF AMERICAN EDUCATION (4 credits)

The educational impact of school, family, and church on American social and cultural life from the colonial period to the present.

HST 523 ADVANCED STUDY IN AFRO-AMERICAN HISTORY (4 credits)

Group reading and discussion, combined with independent research, on such subjects as the nature and scope of Afro-American history, bibliographical materials, the history of Afro-American history, and the Afro-American intellectual.

HST 525 MEDIEVAL EUROPE (4 credits)

The European Middle Ages from about A. D. 400 to 1300, with special emphasis on intellectual developments.

HST 526 THE ITALIAN RENAISSANCE (4 credits)

The European Renaissance period, with special emphasis on the Italian experience.

HST 527 THE NORTHERN RENAISSANCE (4 credits)

European humanism, with special emphasis on the Lowlands, France and Germany.

HST 528 EUROPE IN THE SIXTEENTH CENTURY (4 credits)

A comparative analysis of European society, including such themes as the varieties of humanism; the spiritual crisis of Christendom; the structure of the Renaissance state and formulation of sovereignty, political rebellion, and social revolution; dynastic and ideological warfare; and the effects of the expansion of the West upon European society.

HST 529 EUROPE IN THE SEVENTEENTH CENTURY (4 credits)

A comparative analysis of European society, including such themes as the articulation of absolutism and constitutionalism, the emergence of the European states system, the origins of modern science and rationalism, the culture of the baroque, the development of commercial capitalism, and the tension between new bureaucratic standards of relationship and the personalized nature of premodern society.

HST 534 VICTORIAN AND EDWARDIAN ENGLAND (4 credits)

The political, cultural, and intellectual life of England from 1837 to the outbreak of World War I. Offered irregularly.

HST 535 TWENTIETH CENTURY BRITAIN (4 credits)

The British adjustment to global wars, the later industrial revolution, mass democracy, and social change. Offered in alternate years.

HST 541 EUROPE SINCE 1914 (4 credits)

An analysis of Europe in world perspective since World War I.

HST 542 THE ORIGINS OF MODERN GERMANY (4 credits)

The ancient and medieval roots of German civilization, the political fortunes of the Holy Roman Empire and its member states, the development of the concept of German nationality, and the rise of the German nation-state in the nineteenth century.

HST 543 GERMANY SINCE 1870 (4 credits)

The history of the German nation-state, concentrating on constitutional and political developments in their social context.

HST 545 FRANCE SINCE 1789 (4 credits)

The political development of modern France as a nation-state and the cultural and economic movements connected with French public life. Offered every year.

HST 547 TOOLS OF HISTORICAL RESEARCH (4 credits)

A course to acquaint students of history with the auxiliary sciences of that discipline, with special emphasis on historical bibliography and the use of the library.

HST 548 EUROPE IN THE EIGHTEENTH CENTURY (4 credits)

A comparative analysis of European society, including such themes as the old regime in Europe, the beginnings of industrial development and the resistance to modernization, the Enlightenment as a political and social movement, reform under the monarchy and the emergence of democratic ideologies, and the onset of the French Revolution.

HST 549 FRANCE IN THE AGE OF ABSOLUTISM AND ENLIGHTENMENT (4 credits)

The ancient régime in France from the end of the wars of religion to the beginning of the Revolution (1589-1789).

HST 550 EUROPEAN INTELLECTUAL HISTORY TO 1800 (4 credits)

The main developments in European thought and their implications for art and literature and social change, from the God-oriented world views of the Middle Ages to the application of Newtonian scientific concepts in the eighteenth century Enlightenment. Emphasis will be on the reading of original materials.

HST 551 EUROPEAN INTELLECTUAL HISTORY SINCE 1800 (4 credits)

New ways of thinking established by European intellectuals of the nineteenth and twentieth centuries, especially in their critiques of the traditional rationalist assumptions of earlier ages and the broad cultural implications of their evolutionary, utilitarian, or existentialist attitudes and beliefs. Emphasis will be on the reading of original materials.

HST 552 KIEV AND MUSCOVY (4 credits)

Russian history from the ninth to the seventeenth century with emphasis on the origins of the Kievan state and society, the struggle

against the steppes, and the formation of a centralized Russia under the leadership of Moscow.

HST 553 IMPERIAL RUSSIA (4 credits)

Russian history from Peter the Great to the Bolshevik Revolution: the growth of Russian national power, westernization, serfdom, reform and revolution.

HST 554 SOVIET RUSSIA (4 credits)

Russia and the Soviet Union from 1917 to the present: revolution and civil war, collectivization and industrialization, Stalinism, World War II, de-Stalinization, the Soviet Union and the world communist movement.

**HST 559 RUSSIAN INTELLECTUAL HISTORY (4 credits)
TO PETER THE GREAT**

Main intellectual and cultural developments in Russia prior to Peter the Great. The Russian Church and religious thought, literature, and the development of political ideology will be emphasized.

**HST 560 RUSSIAN INTELLECTUAL HISTORY (4 credits)
SINCE PETER THE GREAT**

Main intellectual and cultural developments since Peter the Great, with emphasis on the nineteenth century. Particular attention is devoted to the slavophiles, the westernizers, the populists and socialists, and several of the great realistic writers.

**HST 563 HISTORY OF SOUTHERN SOUTH (4 credits)
AMERICA**

The social, political and economic history of Argentina, Brazil and Chile in the nineteenth and twentieth centuries; frontier expansion and Indian warfare, slavery and Empire in Brazil, regionalism and nationalism, industrialization and urbanization, and international relations.

**HST 565 THE RESPONSE TO EUROPEAN (4 credits)
COLONIALISM**

A comparative examination of the responses of the peoples of Africa and Latin America to European expansion, with emphasis on such themes as acculturation, resistance movements, nationalism, and modernization.

**HST 566 SLAVERY AND RACE RELATIONS (4 credits)
IN THE NEW WORLD**

A comparative approach to the study of slavery in North America, Latin America, and the Caribbean, and to the present state of race relations in the three areas.

**HST 567 PRE-COLUMBIAN AND COLONIAL (4 credits)
MEXICO**

The scope and achievements of pre-Columbian Indian civilizations; the Spanish Conquest and its aftermath, the emergence of a multi-racial society, the rise of creole nationalism and the achievement of political independence.

**HST 571 CHINA: MID-T'ANG TO THE PEAK (4 credits)
OF MANCHU POWER, CA. 1800**

The institutional, intellectual, and aesthetic responses to the failure of T'ang cosmopolitanism, the elaboration of gentry economic controls, neo-Confucian orthodoxy, the literati ethos, and Chinese accommodations to the problems of foreign encroachment and foreign rule.

HST 573 NINETEENTH CENTURY CHINA (4 credits)

Imperial China during the half century preceding the Opium War of 1839-42, China's growing crisis in the context of the massive Western impact during the second half of the nineteenth century, and the collapse of the traditional Chinese order in the first two decades of the twentieth century.

**HST 574 NATIONALISM AND COMMUNISM (4 credits)
IN CHINA**

The patterns of revolutionary nationalism in China from 1919 to the present, focusing on the Nationalist (Kuomintang) and Communist periods.

**HST 582 THE MUSLIM TRADITION IN (4 credits)
INDIA AND PAKISTAN**

The establishment of Muslim power and culture in South Asia, its accommodation with Hindu culture, the Mughal empire and its decline, and the rise of modern Islamic nationalism, leading to the creation of Pakistan and Bangladesh. Offered in alternate years.

**HST 583 BRITISH IMPERIALISM AND (4 credits)
HINDU NATIONALISM IN INDIA, 1740-1947**

Society and politics in eighteenth century India, changing patterns of imperial rule, the Hindu Renaissance, and nationalist politics, religious, liberal and Marxist. Offered every winter.

HST 586 AFRICAN SOCIALISM (4 credits)

The ideologies, tactics, and techniques of various recent socialist revolutions in Africa and the relation of African socialist aims to traditional and colonial Africa as well as to other forms of socialist thought and practice.

**HST 587 NORTHWESTERN AFRICA (4 credits)
(THE MAGHRIB) SINCE 1830**

The Maghrib from the time of the French occupation to the present.

HST 588 TWENTIETH CENTURY AFRICA (4 credits)

African resistance and nationalist movements from 1875 to the present and the development of Pan-Africanism and Négritude in colonial and contemporary times.

**HST 591 DIRECTED READINGS FOR (4 credits)
GRADUATE STUDENTS**

Directed individual research on specific topics.

HST 500 COMPREHENSIVE EXAMINATION (2 credits)

Graduate Colloquia

- HST 601 COLLOQUIUM IN AMERICAN HISTORY (4 credits)
- HST 602 COLLOQUIUM IN LATIN AMERICAN HISTORY (4 credits)
- HST 603 COLLOQUIUM IN EUROPEAN HISTORY (4 credits)
- HST 604 COLLOQUIUM IN AFRICAN HISTORY (4 credits)
- HST 605 COLLOQUIUM IN EAST ASIAN HISTORY (4 credits)
- HST 606 COLLOQUIUM IN SOUTH ASIAN HISTORY (4 credits)

Intensive research and discussion on a significant period or broad topic in history. Each student will present the results of study as the basis of group discussion. May be repeated for credit.

Research Seminars

- HST 691 SEMINAR IN AMERICAN HISTORY (4 credits)
- HST 692 SEMINAR IN LATIN AMERICAN HISTORY (4 credits)
- HST 693 SEMINAR IN EUROPEAN HISTORY (4 credits)
- HST 694 SEMINAR IN AFRICAN HISTORY (4 credits)
- HST 695 SEMINAR IN EAST ASIAN HISTORY (4 credits)
- HST 696 SEMINAR IN SOUTH ASIAN HISTORY (4 credits)

Small group seminar or individual research on a closely defined subject. Requirements include a research paper of moderate length. May be repeated for credit.

DEPARTMENT OF MATHEMATICS

Chairman:

George F. Feeman

Professors:

Harvey J. Arnold, Ph.D., Princeton University
Louis R. Bragg, Ph.D., University of Wisconsin
John W. Dettman, Ph.D., Carnegie Institute of Technology
George F. Feeman, Ph.D., Lehigh University
William C. Hoffman, Ph.D., University of California
(Los Angeles)
G. Philip Johnson, Ph.D., University of Minnesota
James H. McKay, Ph.D., University of Washington
Harvey A. Smith, Ph.D., University of Pennsylvania

Associate Professors:

Ronald A. DeVore, Ph.D., Ohio State University
Jon Froemke, Ph.D., University of California (Berkeley)
Donald Malm, Ph.D., Brown University
Irwin Schochetman, Ph.D., University of Maryland
Yel-Chiang Wu, Ph.D., Cornell University

Assistant Professors:

J. Curtis Chipman, Ph.D., Dartmouth College
Richard Ewing, Ph.D., University of Texas at Austin
Robert A. Fontenot, Ph.D., Louisiana State University
Gerald S. Garfinkel, Ph.D., Cornell University
Jerrold Grossman, Ph.D., Massachusetts Institute of Technology
Richard Molnar, Ph.D., University of North Carolina at Chapel Hill
Louis J. Nachman, Ph.D., Ohio State University
Robert C. Sharpley III, M.A., University of Texas

The Department of Mathematics offers programs leading to the degrees of Master of Arts in Mathematics and Master of Arts in Teaching in Mathematics. The latter program is jointly sponsored by the College of Arts and Sciences and the School of Education.

THE MASTER OF ARTS IN MATHEMATICS

The curriculum leading to the degree Master of Arts in Mathematics can be used as the first phase of a doctoral program. However, suitable options are provided for those students whose primary interests lie in careers in education, government, industry, or the business world following the completion of their master's degree program. The student's course of graduate study is designed on an individual basis according to his preparation and interests. A student with the usual undergraduate preparation and making normal progress can, while holding a teaching assistantship, satisfy all the requirements for the degree of Master of Arts in four semesters by taking an average of nine credits per semester. Because of the relatively small enrollment in the mathematics graduate program, students can expect to receive a greater than usual amount of individual attention and encouragement from the faculty.

Admission to the Program

Applicants for the program should have strong undergraduate backgrounds in mathematics. It is highly desirable that their preparation include courses in elementary real variable theory or advanced calculus, linear algebra, and abstract algebra. Students having deficiencies in these areas will be required to take appropriate courses to remedy them early in their graduate programs.

Requirements for the Degree

A total of 36 credits is required for the Master of Arts degree. Of this total, a maximum of 12 credits may be in 400-level courses; the remainder must be in 500-level courses. Each student's program is supervised by an advising committee consisting of two faculty members. The committee is charged with passing on the acceptability of the student's program and with the setting and administering of a comprehensive examination after the student has completed twenty credits in the master's degree program.

COURSE OFFERINGS ACCEPTABLE FOR CREDIT TOWARD THE MASTER OF ARTS DEGREE

(One credit hour is equal to one semester hour.)

MTH 405 SPECIAL TOPICS (2 or 4 credits)

Advanced study of some topics in mathematics. May be taken more than once.

MTH 415 FOUNDATIONS OF MATHEMATICS (4 credits)

An examination of the logical foundations of mathematics including analysis of the axiomatic method, basic set theory, cardinal and ordinal numbers, and the axiom of choice.

MTH 422 MATHEMATICAL METHODS IN OPERATIONS RESEARCH (4 credits)

Decision problems in operations research, classical optimization techniques, mathematical programming, queueing theory, game theory and decision making, graphs and networks.

MTH 425 PROBABILITY (4 credits)

Combinatorial analysis, conditional probability, random variables, generating functions, recurrent events, random walk problems, Markov chains, and stochastic processes.

MTH 431 METHODS OF MATHEMATICAL PHYSICS (4 credits)

Series solution of ordinary differential equations, special functions, separation of variables in various coordinate systems, boundary value problems, eigenvalue problems, Fourier series and integrals, Laplace transforms.

MTH 435 INTRODUCTION TO MATHEMATICAL SCIENCE (4 credits)

The mathematical structures of scientific phenomena. Differential equations and dynamical systems. Partial differential equations of the physical and life sciences. Introduction to mathematical modeling.

MTH 451-452 ANALYSIS (4 credits each)

An introductory course in real analysis. Topics covered include the topology of $\mathbb{R}^n$, limits, continuity, differentiation, Riemann integration, uniform continuity and convergence, Riemann-Stieltjes integration, and differentiation and integration in $\mathbb{R}^n$.

MTH 461 GENERAL TOPOLOGY (4 credits)

A study of topological spaces and continuous functions. Separation and countability properties, connectedness, compactness, and local properties will be covered.

MTH 463 GRAPH THEORY AND COMBINATORIAL MATHEMATICS (4 credits)

An introductory course in combinatorics. Topics covered will include techniques of enumeration, fundamental concepts of graph theory, and applications to transport networks, matching theory, and block design.

MTH 465 DIFFERENTIAL GEOMETRY (4 credits)

Theory of curves and surfaces in Euclidean space with an introduction of the theory of matrix Lie groups.

MTH 475-476 ABSTRACT ALGEBRA (4 credits each)

Algebra of sets and mappings, groups and homomorphisms, rings and ideals, factorization and divisibility, vector spaces, linear transformations, fields and field extensions.

MTH 525-526 MATHEMATICAL STATISTICS (4 credits each)

Combinatorial analysis, random variables, central limit theorem, recurrent events, distribution theory, sampling, statistical estimation, hypothesis testing, regression analysis, analysis of variance, and applications.

MTH 541-542 ADVANCED MATHEMATICAL SCIENCE (4 credits each)

Structure of dynamical systems. Application to mechanics, wave motion, diffusion, and statistical mechanics. Dynamical systems and control theory in economics and the life sciences. Fundamental mathematical structures of the physical, life, and social sciences. The role of probability and statistical inference.

MTH 543 ADVANCED OPERATIONS RESEARCH I (4 credits)

First half of a two term sequence on topics from convexity and optimization: mathematical programming. Dynamic programming and the calculus of variations. Graph theory and networks. Game Theory. Queueing theory.

MTH 551-552 REAL ANALYSIS (4 credits each)

The general theory of measure and integration, including development of the Lebesgue integral, elements of functional analysis with applications to probability theory.

**MTH 553 ADVANCED ORDINARY
DIFFERENTIAL EQUATIONS**

Existence and uniqueness, dependence on initial point, asymptotic behavior of solutions, periodic solutions, self-adjoint problems, stability theory and Liapunov functions, Poincare-Bendixson theory, topological methods.

MTH 555-556 COMPLEX ANALYSIS (4 credits each)

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

MTH 561-562 TOPOLOGY (4 credits each)

MTH 561 is an introduction to algebraic topology. Topics covered include elementary homotopy and homology theory. MTH 562 will cover various topics in algebraic and general topology at the discretion of the instructor.

**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, Lie algebras, Banach spaces, or Banach algebras.

MTH 566 TENSOR ANALYSIS ON MANIFOLDS (4 credits)

Topology of differentiable manifolds, tensor algebra, vector analysis on manifolds, integration on manifolds, Riemannian manifolds, symplectic manifolds, applications in science.

MTH 571-572 ALGEBRA (4 credits each)

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

**MTH 590 DIRECTED READING AND (2, 4, 6, or 8 credits)
RESEARCH**

THE MASTER OF ARTS IN TEACHING IN MATHEMATICS

The program leading to the degree of Master of Arts in Teaching in mathematics is sponsored jointly by the College of Arts and Sciences and the School of Education. It is intended to serve the needs of teachers in secondary schools, or community colleges in southeastern Michigan and is designed to accommodate those who are not only primarily interested in the teaching of mathematics but also wish to complete a program with substantial mathematical content. The program will prepare participants for leadership positions in terms of teaching advanced mathematics courses and determining directions of curriculum development. The courses offered in the program have been carefully designed to provide the student with not only a sound knowledge of modern mathematics but also ample opportunity to learn something of the applications of mathematics, the construction of mathematical models, and the art of problem-solving. An important part of the program is devoted to an in-depth study of problems of the secondary mathematics curriculum.

The department is developing a new track within the program for elementary teachers.

As soon as possible after the completion of the six mathematics courses arranged by the department, and prior to their independent reading assignment, candidates for the degree of Master of Arts in Teaching must take a special examination. The examination consists of approximately ten problems, selected by the adviser, varied in context and difficulty. The candidate will have one month in which to work on these problems, after which he will give a verbal presentation on the solutions of some proper subset of the problems selected by the adviser.

Maximum flexibility is allowed in the choice of the required courses in education and psychology. Normally a candidate will choose the education course from among ED 601, 602, 603, or 604. However, a course in the teaching of reading (ED 538) would be appropriate. In general, a course in developmental psychology (PSY 510), tests and measurements (PSY 512), or behavior and learning (PSY 540) is selected to fulfill the psychology requirement.

**Course Offering Acceptable Toward the Master of Arts in
Teaching Degree**

(One credit hour equals one semester hour.)

The courses MTH 325-326, 335-336, 372, 415, and 425 listed below may be used toward the MAT degree if they or their equivalents have not been used toward the candidate's undergraduate degree.

**MTH 325-326 INTRODUCTION TO (4 credits each)
MATHEMATICAL STATISTICS**

A study of random variables and distributions, random sampling, point estimation, interval estimation, tests of hypotheses, regression, and distribution-free methods. The theory is illustrated through applications to various fields.

**MTH 335-336 INTRODUCTION TO (4 credits each)
NUMERICAL ANALYSIS**

An introduction to mathematical methods appropriate to computer work. Topics treated include interpolation, approximation, quadrature, solution of differential equations, and matrix computation.

MTH 372 NUMBER THEORY (4 credits)

Number-theoretic functions, diophantine equations, congruences, and quadratic residues.

MTH 405 SPECIAL TOPICS (2 or 4 credits)

Advanced study of some topics in mathematics. May be taken more than once.

MTH 415 FOUNDATIONS OF MATHEMATICS (4 credits)

An examination of the logical foundations of mathematics including analysis of the axiomatic method, basic set theory, cardinal and ordinal numbers, and the axiom of choice.

MTH 416 CONCEPTS OF GEOMETRY (4 credits)

A development of geometry from an algebraic and metric viewpoint, concentrating on Euclidean geometry. Especially appropriate for Master of Arts in Teaching candidates.

MTH 425 PROBABILITY (4 credits)

Combinatorial analysis, conditional probability, random variables, generating functions, recurrent events, random walk problems, Markov chains, and stochastic processes.

MTH 461 GENERAL TOPOLOGY (4 credits)

A study of topological spaces and continuous functions. Separation and countability properties, connectedness, compactness, and local properties will be covered.

MTH 510 THE SECONDARY MATHEMATICS CURRICULUM (4 credits)

This is a seminar course which will examine in depth some of the problems of the secondary mathematics curriculum. Topics discussed will be determined jointly by the instructor and the students. Emphasis will be on the role and responsibility of the secondary teacher in developing the curriculum.

MTH 514 CONCEPTS IN ABSTRACT ALGEBRA (4 credits)

Designed for Master of Arts in Teaching candidates. Includes topics from groups, rings, fields, matrices, linear transformations, and vector spaces. Offered every other year in alternation with MTH 517.

MTH 516 COMPUTERS AND SECONDARY MATHEMATICS (4 credits)

This course is an introduction to the computer with emphasis on use of the computer in secondary mathematics courses, along with selected mathematics laboratory activities.

MTH 517 CONCEPTS IN ANALYSIS (4 credits)

Designed for Master of Arts in Teaching candidates. Includes a study of real and complex numbers, functions, limits, differentiation, integration, and infinite series, with emphasis on careful proofs of theorems. Offered every other year in alternation with MTH 514.

MTH 519 LINEAR MATHEMATICS AND MATHEMATICAL MODELS (4 credits)

This course will include topics from linear algebra, game theory, and linear programming with applications to the social sciences. Especially appropriate for MAT candidates.

MTH 590 DIRECTED READING AND RESEARCH (2, 4, 6, or 8 credits)

MTH 614 HISTORY OF MATHEMATICS (4 credits)

Mathematics from ancient to modern times, its growth, development, and place in man's culture. Designed for MAT students.

Related Courses

ED 538 READING DEVELOPMENT IN JUNIOR AND SENIOR HIGH SCHOOLS (4 credits)

Emphasis is placed on solving problems in the development, improvement, and evaluation of an all-school instructional program

in reading, with focus upon reading instruction using content materials.

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.

ED 602 PHILOSOPHY OF EDUCATION (4 credits)

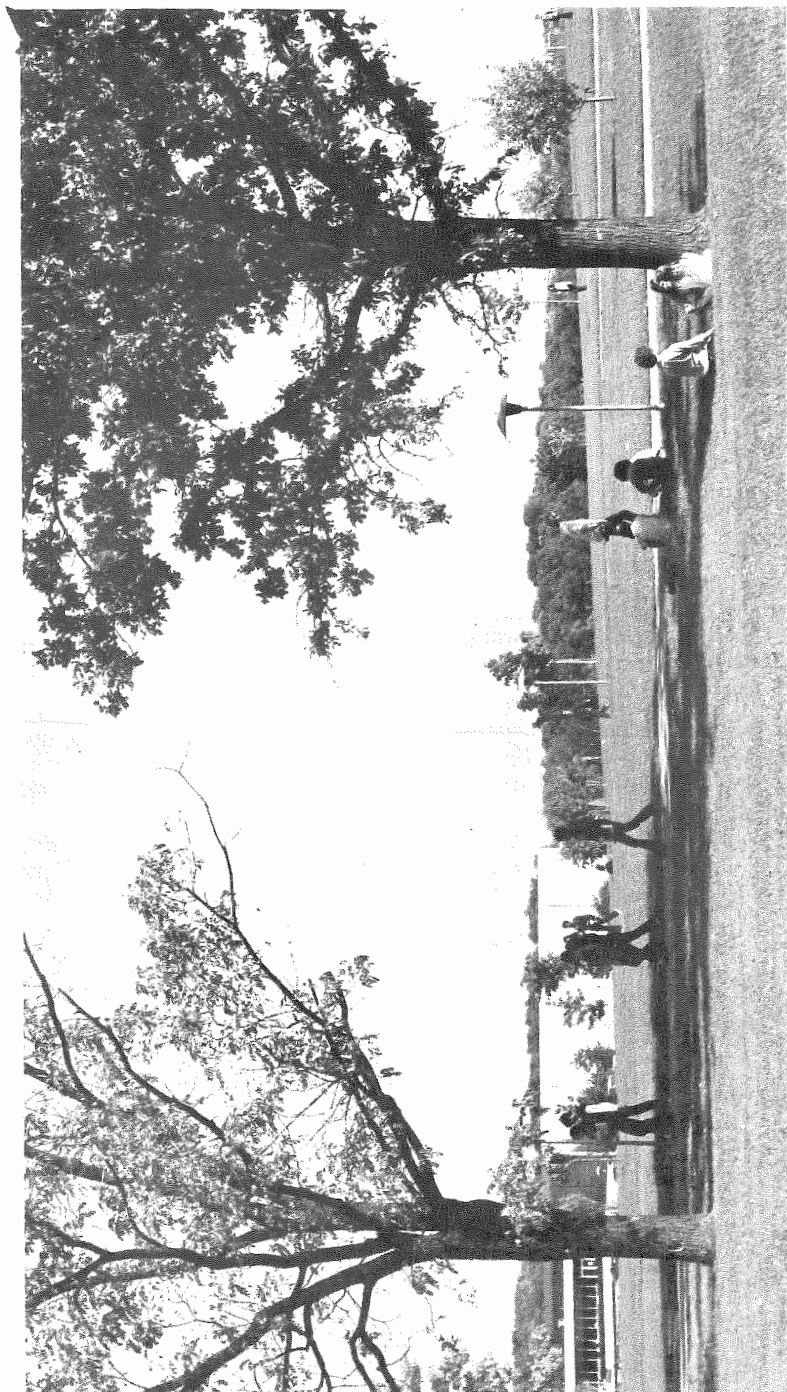
A study of philosophical inquiry in relation to education. Philosophic analysis of educational problems, educational conclusions by systemic philosophers, logical relationships between various philosophical and educational positions are among the topics considered.

ED 603 CROSS-CULTURAL STUDIES IN EDUCATION (4 credits)

This course offers an opportunity for study of educational systems other than that of the United States. Special attention is given to education's relationship to language policy, national unification, and economic development. Europe, Asia, and Africa provide the setting for consideration of the instrumental role schools play in defining equal opportunity and individual's subsequent life-chances in their society.

ED 604 SOCIOLOGY OF EDUCATION (4 credits)

A study of social and cultural forces and their impact on the organization and practices of schools. An investigation of social dynamics within the schools and the impact of schools on other institutions of society.



DEPARTMENT OF PHYSICS

Chairman:

Abraham R. Liboff

Professors:

Abraham R. Liboff, Ph.D., New York University
 John M. McKinley, Ph.D., University of Illinois
 Ralph C. Mobley, Ph.D., University of Wisconsin
 Robert M. Williamson, Ph.D., University of Wisconsin

Associate Professors:

Norman Tepley, Ph.D., Massachusetts Institute of Technology
 Paul A. Tipler, Ph.D., University of Illinois
 W. D. Wallace, Ph.D., Wayne State University

Assistant Professors:

Paul M. Doherty, Ph.D., Massachusetts Institute of Technology
 Jeffry V. Mallow, Ph.D., Northwestern University

Adjunct Professor:

Gifford G. Scott, Sc. D. (Honorary)

Adjunct Associate Professor:

Norman H. Horwitz, Ph.D., Wayne State University

THE MASTER OF SCIENCE IN PHYSICS

The program leading to the degree of Master of Science in physics consists of courses, research, seminar participation, and a final research report or critical essay. A formal thesis is not required. Students receiving the degree will be prepared to work toward the degree of Doctor of Philosophy in physics, to teach at the junior college 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 should complete the required courses and research credits in three semesters. Each student's program will be adjusted to his or her interests and background. PHY 673, research, and a final written report or critical essay are the only fixed requirements.

Admission to Course

An applicant for admission to the Master of Science program 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.

Requirement for the Degree

The basic degree requirement is successful completion of 36 credits of graduate courses distributed as follows: 4 credits of PHY 673, Quantum Mechanics; 24 credits of additional 400-, 500-, or 600-level courses approved by the department; 8 credits of research, including a final written report or critical essay.

RESEARCH FIELDS AND FACILITIES

The faculty of the Department of Physics is currently involved in research in a number of areas. The biophysics laboratory has been studying electrically mediated growth mechanisms in living systems. The experimental nuclear physics group has been studying environmental radiation, particle scattering, gamma ray spectroscopy and nuclear instrumentation development. The solid state and molecular physics group has been studying electronic and magnetic properties of metals and gyromagnetic properties of solids and gases. The theoretical group has been concerned primarily with nuclear structure studies.

Research facilities include a two megawatt pulsed CO₂ laser for biophysics research, probably the world's largest standard air ionization chamber for radiation monitoring, a 450 Kv Cockcroft-Walton nuclear particle accelerator, a 1024 channel pulse-height analyzer, a time of flight analyzer and associated fast-pulse electronics for low energy experimental nuclear physics, a high field nine inch Varian magnet, liquid helium cryostats, ultrasonic gear covering the frequency range from 100 KHz to 10 GHz for measurements of superconductivity, electronic structures of metals and phase transitions in solids, liquids and certain biological materials, and the Kettering Magnetics Laboratory, unique in the United States, which provides a non-magnetic environment for use in gyromagnetic studies of solids (Einstein de Haas effect) and in gases (Scott effect) or other research requiring a very stable magnetic and/or mechanical environment. An eight inch Newtonian or Cassegrain reflecting telescope is housed in a separate observatory. In addition, an environmental radiation laboratory is planned. Supporting facilities include an electronics shop, a student shop, and a well-equipped machine shop staffed by experienced instrument makers. Computer facilities include a Burroughs B5500 timesharing computer.

COURSE OFFERINGS

(One credit hour is equal to one semester hour.)

Selected 400-level courses which may carry graduate credit.

PHY 417-418 ADVANCED LABORATORY (2 credits each)

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 and 347-348, or equivalent.

Prerequisites or corequisites: PHY 331 and 361, and 371, or equivalent.

PHY 421 THERMODYNAMICS (4 credits)

Principles of non-relativistic 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.

Prerequisites: PHY 361 and MTH 255, or equivalent.

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 and MTH 255, or equivalent.

GRADUATE COURSES

PHY 522 STATISTICAL THERMODYNAMICS (4 credits)

Review of classical thermodynamics. Kinetic theory of gases, transport phenomena, classical and quantum statistics, partition functions and thermodynamic properties, ensembles, fluctuations.

PHY 542 ADVANCED ELECTRONICS (4 credits)

Selected topics in the analysis and design of electronic circuits.

Prerequisites: PHY 341 or equivalent.

PHY 548 ADVANCED ELECTRONICS LABORATORY (2 credits)

Prerequisite: PHY 348 or equivalent.

PHY 552 THEORETICAL PHYSICS (4 credits)

Applications in advanced physics in the area of partial differential equations, eigenvalue problems, special functions, spherical harmonics, Green's functions, variational methods, linear vector spaces, tensors.

Prerequisites: PHY 361, PHY 371, PHY 381.

PHY 562 MECHANICS (4 credits)

Methods of Lagrange and Hamilton, tensor algebra, rigid bodies in three dimensions, continuous media, and coupled systems.

Prerequisites: PHY 361 and MTH 255, or equivalent.

PHY 565 PHYSICS OF CONTINUOUS MEDIA (4 credits)

An introduction to elasticity and fluid mechanics, including tensors, stress, strain, flow, conservation principles, constitutive equations, elasticity and fluid mechanics.

Prerequisite: PHY 361.

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 protons 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, emphasis on current experimental techniques.

Prerequisites: PHY 472 and 562, or equivalent.

PHY 600 SEMINAR (1 credit)

PHY 673 QUANTUM MECHANICS (4 credits)

Review of Schrödinger wave mechanics, formal algebraic approach to quantum mechanics approximation methods, elastic scattering.

Prerequisites: PHY 472 and 562, or equivalent.

PHY 674 ADVANCED QUANTUM (4 credits)
MECHANICS

Continuation of PHY 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

Chairman:

Boaz Kahana, Associate Professor

Professors:

Edward Bantel, Ed.D., Columbia University
David C. Beardslee, Ph.D., University of Michigan
Harvey Burdick, Ph.D., University of Minnesota
Donald C. Hildum, Ph.D., Harvard University

Associate Professors:

Jean S. Braun, Ph.D., Wayne State University
Daniel N. Braunstein, Ph.D., Purdue University
Max Brill, Ph.D., University of Cincinnati
Kenneth Coffman, Ph.D., Northwestern University
Peter Jammers-Murdoch, Ph.D., University of North Carolina at Chapel Hill
Boaz Kahana, Ph.D., University of Chicago
David G. Lowy, Ph.D., University of Tennessee
Ralph Schillace, Ph.D., University of Cincinnati
David W. Shantz, Ph.D., Purdue University
Irving Torgoff, Ph.D., University of Rochester

Assistant Professors:

Robert Blockovich, Ph.D., Wayne State University
Algea O. Harrison, Ph.D., University of Michigan
Allen K. Hess, Ph.D., University of Kentucky
Leonard Ireland, Ph.D., State University of New York at Buffalo
Lawrence Lilliston, Ph.D., Temple University
Gary A. Klein, Ph.D., University of Pittsburgh
Virginia E. Leary, Ph.D., Wayne State University
F. Edward Rice, Ph.D., Michigan State University
Harold Zepelin, Ph.D., University of Chicago

THE MASTER OF ARTS IN PSYCHOLOGY

The primary purposes of the programs leading to the degree of Master of Arts in psychology are to train students at the intermediate professional level and to initiate students into advanced scholarship in preparation for additional graduate study at other institutions. The areas in which a student may concentrate are clinical psychology or developmental psychology.

Admission to and Requirements for Clinical Psychology

The program in clinical psychology is designed to prepare students to evaluate and treat patients in a clinical setting. Individuals interested in becoming school diagnosticians will require some further preparation in educational psychology, but will find the basic program appropriate for acquisition of needed clinical skills. Students who complete the Master of Arts in clinical psychology are eligible for certification by the State of Michigan as psychological examiners.

An applicant for admission should have a bachelor's degree from an accredited institution or proof of equivalent achievement. While an undergraduate major in psychology is not required, students are expected to be acquainted with the field to the extent of having

had the following courses or their equivalents: Foundations of Introductory Psychology, Experimental Psychology, Statistics and Research Design, and Abnormal Psychology. Theories of Personality is additionally recommended. Applications for admission will be accepted up to March 1 and will be reviewed and decisions rendered on March 15, for admission the following September, which is the only time that new students are admitted. The number of students admitted to this program is limited.

The clinical program is a two-year program. The first year the typical student takes two courses each semester. These courses are generally offered in the late afternoon. The second year the student must have sufficient time for the practicums, which require half time during the traditional work week. It is the student's responsibility to have the time available for the practicums. Nine courses (36 credits) are required. All students must take the Research Methods and Project (PSY 692). In addition, the curriculum must include Advanced Abnormal (PSY 624), Individual Testing (PSY 620), Projective Test (PSY 621), Clinical Psychology (PSY 622), Child Clinical Psychology (PSY 623) and Practicum I and II (PSY 625). Students in the clinical program have the option of completing a research project (PSY 690) or of taking an elective course, such as Child Clinical Psychology: Intervention and Treatment (PSY 626). Those students who plan to go on for a Ph.D. are strongly urged to complete the research project.

Practicum placements are arranged through faculty members and must be approved by the clinical faculty. Ordinarily, one semester (20 hours per week) is devoted to diagnostic workups and the second semester to therapy under intensive supervision. No practicum placements may be made during the summer.

A 3.0 or B average is required to remain in good academic standing. In addition each clinical student must receive at least a 3.0 in each of the testing courses and satisfactorily complete both practicums in order to graduate.

Admission to and Requirements for Developmental Psychology

The program in developmental psychology is designed to familiarize students with the theoretical and applied issues of life span development as manifested in specified age groupings: childhood, adolescence, maturity, old age. Emphasis is on training the student in the application of developmental psychology in a wide variety of community settings.

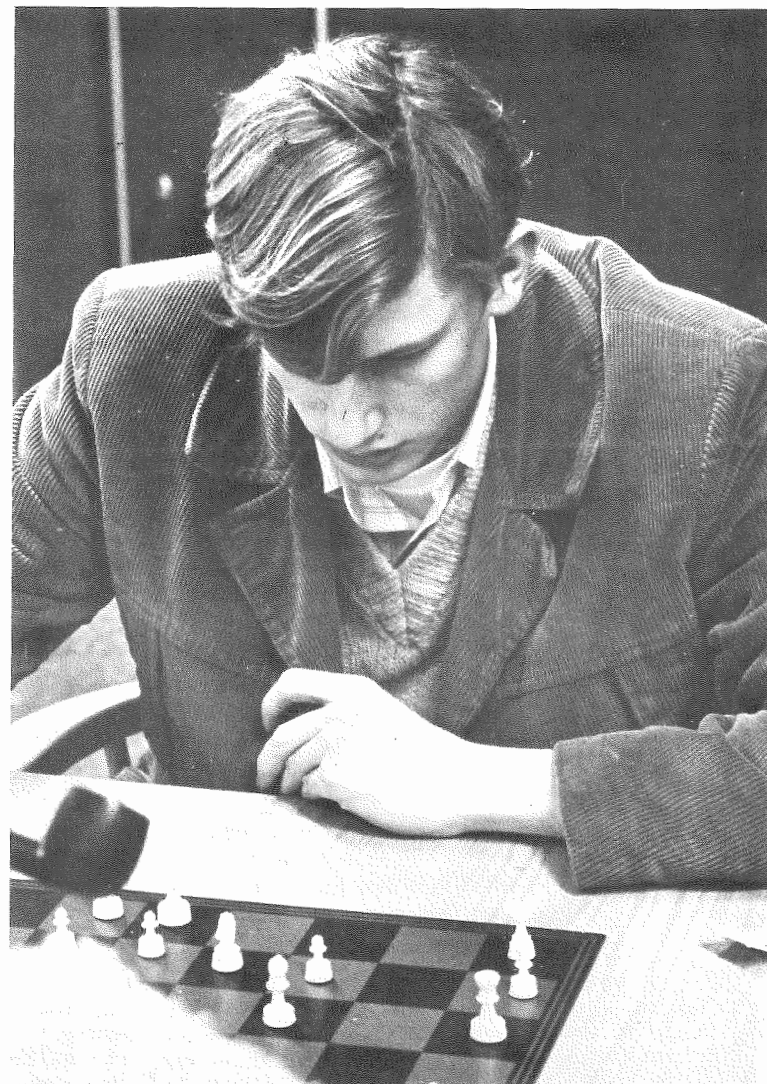
An applicant for admission should have a bachelor's degree from an accredited institution or proof of equivalent achievement. While an undergraduate major in psychology is strongly recommended, it is not required. All applicants are expected, however, to be acquainted with the field to the extent of having had the following courses or their equivalents: Foundations of Introductory Psychology, Statistics and Research Design, Experimental Psychology, and Child Development or Adolescence, or Socialization in the Family. Applications for admission are reviewed and decisions rendered in March, May, and July of each year for admission the following September, which is the only time that new students are admitted.

Nine courses (36 credits) are required. All students must take the Pro Seminar (PSY 691), Research Methods and Project (PSY 692), Theories of Development (PSY 575), Perceptual and Cognitive Development (PSY 571), Social and Personality Development (PSY

570), Psychology of Adolescence and Aging (PSY 572), Applied Developmental (PSY 670), and Assessment and Decision Making Procedures in Developmental Psychology (PSY 671), and must complete a research thesis.

Students take two courses a semester (classes meet in the evening), requiring a minimum of two academic years for acquiring a degree.

After students have completed 16 credits (normally 4 courses), the student's progress will be evaluated. A grade point average of 3.0 or better is required for good academic standing. Two grades below 3.0 or one grade below 2.5 render a student subject to dismissal from the degree program.



COURSE OFFERINGS

PSY 510 DEVELOPMENTAL PSYCHOLOGY (4 credits)

(One credit hours is equal to one semester hour.)

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

Prerequisite: Permission of the instructor or acceptance into the Master of Arts in Teaching program.

PSY 512 TEST AND MEASUREMENTS (4 credits)

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

Prerequisite: Permission of the instructor or acceptance into the Master of Arts in Teaching program.

PSY 513 PSYCHOPATHOLOGY OF CHILDHOOD (4 credits)

A survey of the psychopathology of children and adolescents, emphasizing dynamic and cognitive-perceptual-motor variables.

Prerequisite: PSY 510 or 512 or acceptance into the Master of Arts in Teaching program in special education, or acceptance into the graduate program in psychology, or undergraduate major in psychology, or permission of the instructor.

PSY 520 ADVANCED PSYCHOPATHOLOGY (4 credits)

Theories of psychopathology, research literature and in-depth review of approaches to classification and definition of deviant behavior in adults and children.

Prerequisites: PSY 220 and PSY 320

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 processes as education, psychotherapy and the development of motives.

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

PSY 541 ADVANCED GENERAL PSYCHOLOGY (4 credits)

A survey of the current frontiers of knowledge and new methodology in the whole range of psychology. Intended for senior majors and graduate students. (Normally offered in the fall semester).

Prerequisite: Permission of the instructor.

PSY 551 ADVANCED STATISTICS (4 credits)

Following a review of descriptive and simple inferential statistics, major emphasis will be given to analysis of variance procedures.

Prerequisite: An undergraduate course in statistics.

PSY 570 SOCIAL AND PERSONALITY DEVELOPMENT (4 credits)

Theory, research, and applied activity focusing on familial and extra-familial socialization, parent-child relations, peer influences, and impact of social change on personality. Field experiences.

Prerequisite: Acceptance into the graduate program in developmental psychology, or permission of the instructor.

PSY 571 PERCEPTUAL AND COGNITIVE DEVELOPMENT (4 credits)

Developmental nature of perception, learning, reasoning, concept formation, cognitive style, problem-solving behavior, and language. Field experiences.

Prerequisite: Acceptance into the graduate program in developmental psychology, or permission of the instructor.

PSY 572 PSYCHOLOGY OF ADOLESCENCE AND AGING (4 credits)

An examination of significant structural, functional, and behavioral changes during adolescence and old age. This material will be integrated with field experiences in relevant applied settings.

Prerequisite: Acceptance into the graduate program in psychology or permission of the instructor.

PSY 575 THEORIES OF DEVELOPMENT (4 credits)

Issues and theories concerning the developmental process from birth to old age. Approaches of such theorists as Lewin, Freud, Piaget, Erikson, and leading exponents of social-learning theory examined.

Prerequisite: Acceptance into the graduate program in developmental psychology or permission of the instructor.

PSY 576 SOCIALIZATION IN THE FAMILY (4 credits)

Some of the areas of research and theory on socialization process. Areas of focus: attachment and separation, conscience development, sex-role identity, ego-identity, etc. Role of principal agents: e.g., family, peers, school, etc.

Prerequisites: PSY 271, Child Development.

PSY 590, 591, 592, 593, 594, 595 SEMINAR (4 credits each)

Seminars offered occasionally by faculty members to explore special topics not listed among regular offerings, either on own initiative or request of a group of students.

Prerequisite: Permission of the instructor.

PSY 597, 598 APPRENTICE COLLEGE TEACHING (4 credits each)

Supervised participation in teaching of undergraduate psychology courses. Discussion of teaching objectives and methods. Only one course may be offered in fulfillment of departmental requirements.

Prerequisite: Permission of the instructor.

PSY 620 INDIVIDUAL TESTING (4 credits)

Theory of intelligence testing. Administration and interpretation of Stanford-Binet and Wechsler tests.

Prerequisite: Acceptance into the graduate program in clinical psychology.

PSY 621 PROJECTIVE TESTS (4 credits)

Theory, demonstration, and practical training in the use of projective techniques with special emphasis on Rorschach and the thematic apperception test.

Prerequisite: Acceptance into the graduate program in clinical psychology.

PSY 622 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 the graduate program in clinical psychology.

PSY 623 CHILD CLINICAL PSYCHOLOGY: (4 credits)
NORMAL AND ABNORMAL
SOCIAL-PERSONALITY DEVELOPMENT

An examination of normal and abnormal social-personality development in children, with emphasis on causative factors and implications for clinical activity.

Prerequisite: Admission to graduate program in psychology.

PSY 624 ADVANCED ABNORMAL (4 credits)

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

Prerequisite: Acceptance into the graduate program in clinical psychology.

PSY 625 PRACTICUM I AND II (8 credits)

Practical experience in areas of specialized training. Credit for the first semester will not be granted until the second semester has been successfully completed.

Prerequisites: Admission to the graduate program in clinical psychology and permission of the adviser.

PSY 626 CHILD CLINICAL PSYCHOLOGY: (4 credits)
TECHNIQUE OF ASSESSMENT AND
INTERVENTION

An examination of various techniques for assessing and modifying the behavior of children and families with problems.

Prerequisites: Admission to the graduate program in clinical psychology and PSY 623.

PSY 670 APPLIED DEVELOPMENTAL (4 credits)
PSYCHOLOGY

Analysis of the role of the developmental psychologist in the context of social action programs.

Prerequisite: Acceptance into the graduate program in psychology.

PSY 671 ASSESSMENT AND DECISION (4 credits)
MAKING PROCEDURES IN
DEVELOPMENTAL PSYCHOLOGY

Examination of procedures assessing developmentally relevant characteristics of individuals, their relations to others, to groups (peers, family, etc.) and to setting (home, school, institution).

Prerequisite: PSY 692 or permission of the instructor.

PSY 672 INFANCY AND CHILDHOOD (4 credits)

An in-depth consideration of research and theory on the development of the human organism from conception to puberty. The in-

teraction between the various behavioral and social processes will be emphasized along with a consideration of abnormalities in development. Field work may be required.

Prerequisite: Acceptance into the graduate program in developmental psychology.

PSY 673 ADOLESCENCE AND YOUTH (4 credits)

An examination of significant age-related changes during adolescence and youth, including an emphasis on the dynamic interactions between physical maturation, personality development, and social variables. Attention will also be given to the adjustment problems involved in making the transition from childhood to adulthood. Field experiences may be required.

Prerequisite: Acceptance into the graduate program in developmental psychology.

PSY 674 ADULTHOOD AND AGING (4 credits)

An intensive study of developmental phenomena during the period from adulthood to death. Topics considered will include marital and occupational adjustment as well as the relationship between personality and the aging process. Field experiences may be required.

Prerequisite: Acceptance into the graduate program in developmental psychology.

PSY 675 PRACTICUM IN DEVELOPMENTAL (4 credits)
PSYCHOLOGY

Supervised experience in an agency relevant to the student's area of specialization. The student is expected to make use of skills developed during course work. In addition, the development of new skills through practicum experience is encouraged.

Prerequisite: Acceptance into the graduate program in developmental psychology.

PSY 690 RESEARCH PROJECT (4 credits)

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

Prerequisites: Admission to the graduate program in psychology and permission of the adviser.

PSY 691 PRO-SEMINAR (4 credits)

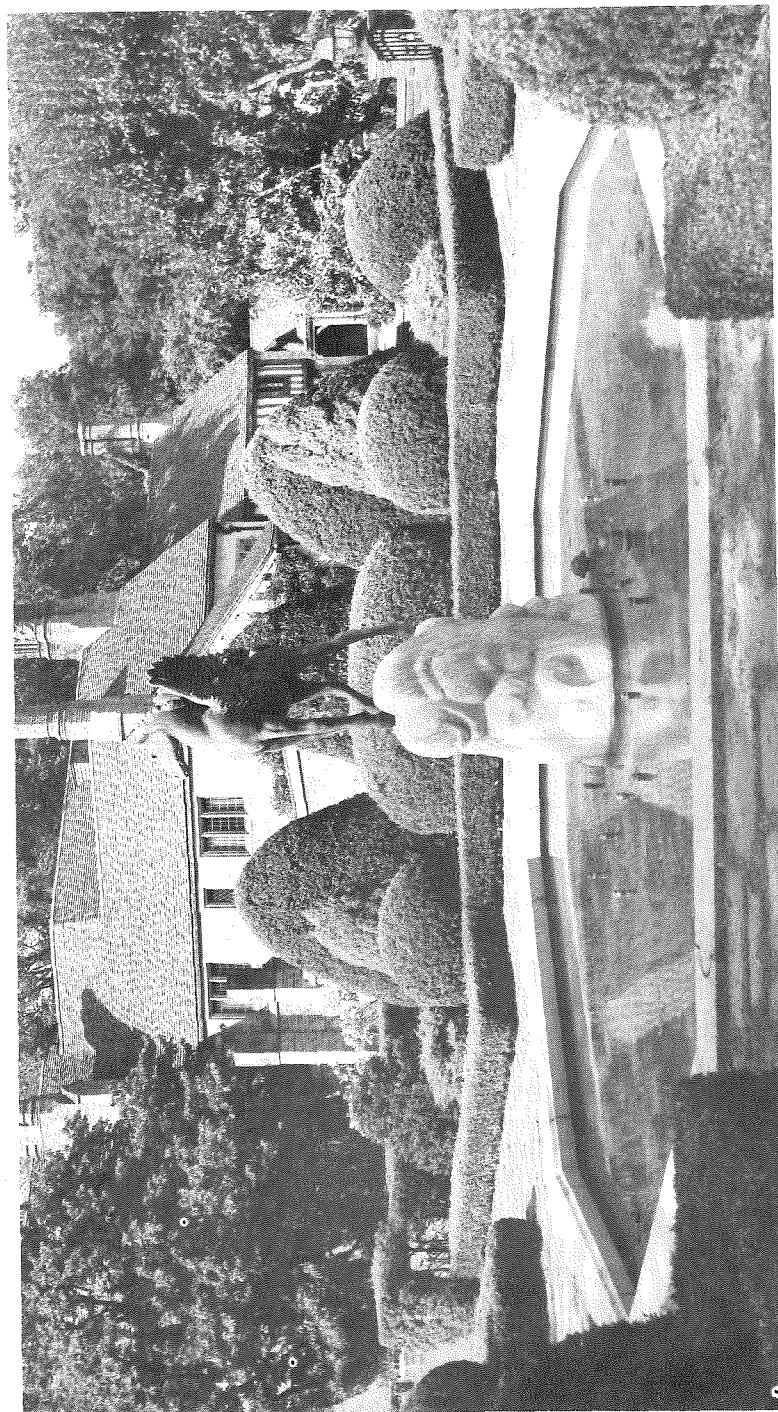
An overview of current major issues and research in personality, learning, perception-cognition, social psychology, and motivation.

Prerequisite: Acceptance into the graduate program in psychology.

PSY 692 RESEARCH METHODS AND PROJECTS (4 credits)

A study of issues involved in the formulation of research problems and hypotheses, design strategies, and techniques of data analysis. Each student will be required to design an individual research project.

Prerequisite: Acceptance into the graduate program in psychology.



SCHOOL OF ECONOMICS AND MANAGEMENT

Dean:

Norton C. Seeber

Assistant to the Dean:

Harvey A. Shapiro

Professors:

Robbin R. Hough, Ph.D., Massachusetts Institute of Technology
Siddheshwar Mittra, Ph.D., University of Florida
Norton C. Seeber, Ph.D., University of California, (Berkeley)

Associate Professors:

Eleftherios N. Botsas, Ph.D., Wayne State University
Daniel N. Braunstein, Ph.D., Purdue University
Karl D. Gregory, Ph.D., University of Michigan
John E. Tower, Ph.D., State University of New York at Buffalo
Alan G. Weinstein, Ph.D., Wayne State University

Assistant Professors:

David P. Doane, Ph.D., Purdue University
Alice C. Gorlin, Ph.D., University of Michigan
Douglas D. Gregory, Ph.D., Northwestern University
John Hurd II, Ph.D., University of Pennsylvania
Kenneth B. Moberg, Ph.D., Purdue University
Gadis Nowell, M.B.A., Atlanta University
Richard M. Reese, Ph.D., University of Texas at Austin
Richard M. Steers, Ph.D., University of California (Irvine)
Eugene Stone, Ph.D., University of California (Irvine)
Kenneth C. Young, Ph.D., Purdue University

Instructors:

Diane B. Herker, M.B.A., University of Wisconsin
Harvey A. Shapiro, B.S., Carnegie-Mellon University
Socrates D. Tountas, M.A., University of Wisconsin

Adjunct Professor:

Theodore O. Yntema, Ph.D., University of Chicago

Visiting Professor:

Andrew C. Stedry, Ph.D., Carnegie-Mellon University

THE MASTER OF SCIENCE IN MANAGEMENT

A program leading to the Master of Science in Management is offered by the School of Economics and Management. The program stresses recognized common elements in management rather than concentrating on narrow traditional specialties. It is designed to educate students for managerial roles in either the private or public and not-for-profit sectors of the economy. In the program, learning experiences are designed to integrate areas of economics, behavioral science, and quantitative methods with functional aspects of managerial problems. At the same time, students are prepared for entry-level jobs in both private and public sectors.

The School of Economics and Management was established in July 1969. The Master of Science in Management program began in 1972 and has been growing rapidly since that time. However, classes are kept small enough to encourage substantial student-faculty and student-student interaction. Graduate students elect voting representatives to the Graduate Policy Committee which oversees the M.S.M. program and the Graduate Admissions Committee. The students also organize a colloquium with visiting businessmen and professionals, "The Visiting Manager's Forum." Thus, students have the opportunity to exert a significant influence on their own education and the environment in which it takes place.

Admission to Course

Admissions are selective and depend on several elements, including scholarship, personal character traits, and an ability to communicate and interact effectively. To be admitted to graduate study, a student must first have a bachelor's degree or its equivalent from an institution of recognized standing.

The program is designed primarily for students with little or no prior academic experience in management courses. Applications are welcome from students with bachelor's degrees in all arts and sciences fields, engineering, nursing, education, and other professional schools. Students are expected to possess certain skills in basic mathematics and in the social sciences or to demonstrate an ability to acquire these within the early part of their participation in the program. The applicant must also meet the general requirements for admission to graduate study at Oakland University for the year in which he or she applies. All applications are considered by the Graduate Admissions Committee of the School of Economics and Management which takes into account an applicant's qualifications as evidenced by his or her undergraduate record, letters of recommendation, responses to application questions, and scores on the Admission Test for Graduate Study in Business (ATGSB).

Admission Test for Graduate Study in Business

All applicants for admission must submit scores from the ATGSB (administered by the Educational Testing Service, Princeton, N. J., four or more times a year, throughout the world). No applicant will be considered until the score from this test is received by the Office of Graduate Study at Oakland University. No other test will be considered as a substitute. Normally, the exam is given in November, January, March, and July. Information about specific examination dates and locations must be obtained by writing to E.T.S.

Mathematics Proficiency

In general, the M.S.M. program requires a mathematics background at the level of beginning calculus. However, it is recognized that there are substantial variations in mathematics proficiency. All students will be required to take a mathematics diagnostic test upon entrance, and, if appropriate, complete a sequence of self-instructional units during the first semester of the program. In addition, some students who clearly are well-prepared for entrance but are deficient in mathematics may be admitted to the program on a conditional basis. In either case, failure to eliminate a mathematics deficiency may subject a student to probation or dismissal.

Full Time and Part Time Requirements

Students may elect to enter the program on a full time or part time basis. "Full time" is defined as twelve credit hours in both the fall and winter terms for a period of two years. "Part time" status is for students who wish to take two courses in the fall, two courses in the winter, and one course in each of the spring and summer sessions for two years. Thus, all students, whether full time or part time, can complete the program in two calendar years. Because of the sequential and integrative nature of the program, students will not be admitted to take courses on a piece-meal, one-course-at-a-time basis. All students, but especially those intending to enroll as part time students, should be aware of the very high demands placed on them by graduate work in a program of this type. These demands are more typical of an executive development program than a typical MBA curriculum. Thus, prospective students should be aware of the need to coordinate graduate study with commitments to work and/or family.

Time of Admission

Full time students are normally admitted to the M.S.M. program only in the fall term. Part time students may be admitted either in the fall term or in the spring session. The spring session normally begins the latter part of April, and part time students entering at that time start the fall term at a more advanced stage than other entrants as a result of the spring and summer study. Candidates for spring term entry should complete their applications prior to March 1; fall entry applications should be complete by July 1. Candidates must be certain to take the ATGSB exam at least one month in advance of these dates since this is the time required for the score to be sent to Oakland University.

Program of Study

The Master of Science in Management (M.S.M.) program consists of 48 semester hours of credit. It assumes no previous academic preparation in management or business courses. A typical entering class may consist of substantial numbers of undergraduate majors from the social and natural sciences, engineering, and the humanities, as well as from other majors.

The program is directed toward a well-developed set of general considerations or goals. These include the beliefs that education for management should:

- a. Prepare students for careers involving problem identification, problem-solving, decision-making, and leadership in any type of organizational setting.
- b. Emphasize the determination of goals and the effective utilization of scarce resources to achieve these goals.
- c. Help students to understand the physical and social environments in which they live and to participate in them effectively and fruitfully.
- d. Stress understanding of human behavior and organizational settings, for much of management relates to people—to understanding them, to communicating with them, to working with them, and to leading them.

The program is organized around several core sequences, each of which is broken into subdivisions or modules called "Course Blocks." A "Course Block" is equivalent to approximately one-

quarter of the semester, i.e., equivalent to one semester-hour credit. "Course Blocks" may stand alone but are ordinarily combined with other blocks to form a larger unit of instruction. An important advantage of arranging the curriculum in this fashion is that it allows greater flexibility in the planning of individual instruction and in the combining of instructional elements.

The second year of the program emphasizes a "constrained option" and a large "project" developed through student-faculty interaction and involving direct experience in outside organizations. It includes a small number of core blocks, free electives, and self-instructional blocks. The "project" is an important part of the program and is carried through the entire last term for the equivalent of one course.

Because the core requirements are substantial and demanding, the School of Economics and Management does not offer formal majors within the M.S.M. program. Students may, however, through selection of electives plus work in conjunction with the second-year project, complete the equivalent of a concentration in one of several areas. It is expected that the School will soon offer more formal concentrations in public-sector management, accounting and finance, organizational behavior, marketing, systems analysis, and other subjects of interest to students. Questions concerning the availability of specific topics may be addressed to the Coordinator, Graduate Programs, School of Economics and Management.

The accompanying block diagram illustrates the overall character of the program, describes each of the modules in the courses, and shows relationships between course work and the second-year project.

Required Courses and Prerequisites

All students must enroll in the sequence of required courses in the order shown in the program diagram. *Each semester's courses serve as prerequisites for the following semester's courses.* Exceptions will be made only in rare cases by special permission. The Graduate Program Coordinator must be contacted in such cases.

LIST OF REQUIRED COURSES

(Fall, Year 1)

MGT 510 CONSISTS OF MODULES COVERING:
COMPUTER LANGUAGES AND PROGRAMMING
COMPUTER INFORMATION SYSTEMS DESIGN
PROBLEM PERCEPTION AND IDENTIFICATION
SYSTEM MODELING

MGT 520 CONSISTS OF MODULES COVERING:
OPTIMIZING PROCESSES
ACCOUNTING INFORMATION
MICROECONOMIC DECISION ANALYSIS
INFORMATION AND DECISION STRUCTURES

MGT 530* CONSISTS OF MODULES COVERING:
QUANTITATIVE MEASUREMENT AND
STATISTICS
ORGANIZATIONAL BEHAVIOR

(Winter, Year 1)

MGT 511 CONSISTS OF:
A CASE STUDY
PLANNING AND CONTROL MODELS

MGT 521 CONSISTS OF MODULES COVERING:
OPTIMIZING AND DECISION MODELS
DECISION-MAKING AND CREATIVITY

MGT 531* CONSISTS OF:
A PROJECT IN ORGANIZATIONAL BEHAVIOR
MODELS OF COMPLEX ORGANIZATIONS

(Fall, Year 2)

MGT 610 CONSISTS OF MODULES COVERING:
MANAGEMENT FUNCTIONS (MARKETING,
FINANCE, PRODUCTION, ETC.)
CONSTRAINED ELECTIVE (IN A FUNCTIONAL
AREA)

MGT 620 CONSISTS OF MODULES COVERING:
MACROECONOMIC SYSTEMS
ORGANIZATIONAL GOALS, POLICY AND
STRATEGY (INCLUDES VISITING
MANAGER'S FORUM)

(Winter, Year 2)

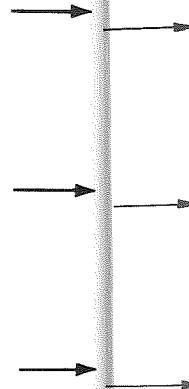
MGT 611 CONSISTS OF:
M.S.M. PROJECT

*Part time students will take these courses in the spring session.

Oakland University Master of Science In Management Program

FALL, YEAR 1

Orientation and Introduction	MGT 510 (a-d) Managerial Problem Perception		
	Computer Languages and Programming	Computer Information Systems Design	Problem Perception and Identification
	Systems Modelling		
	MGT 520 (a-d) Decision and Optimization Models		
	Optimizing Processes	Accounting Information	Microeconomic Decision Analysis
	Information and Decision Structures		
	MGT 530 (a-d) Organizational Analysis and Implementation		
	Quantitative Measurement and Statistics		Organizational Behavior



Oakland University Master of Science In Management Program

WINTER, YEAR 1

MGT 511 (a,b) Case Study		MGT 511 (c,d) Planning and Control Models	
MGT 521 (a,b,c) Optimizing and Decision Models		MGT 521 (d) Decision-making and Creativity	
MGT 531 (a,b) Project in Organizational Behavior		MGT 531 (c,d) Models of Complex Organizations	

FALL, YEAR 2

MGT 610 (a,b) Management Functions (Marketing, Finance, Production, etc.)	MGT 610 (c,d) Constrained Elective (In a Functional Area)
MGT 620 (a,b) Macroeconomic Systems	MGT 620 (c,d) Organizational Goals, Policy and Strategy (Includes Visiting Managers Forum)
MGT 630 (a-d) Elective (4 Credits)	

*Taken in Spring/Summer by part-time students.

WINTER, YEAR 2

MGT 611 (a-d) Project			
MGT 621 (a)	MGT 621 (b)	MGT 621 (c)	MGT 621 (d)
Elective (4 Credits)			
MGT 631 (a-d) Elective (4 Credits)			

*Taken in Spring/Summer by part-time students.

Visiting Manager's Forum

As part of the policy course (620 c,d) in the second year, students organize a series of informal evening discussions at the Meadowbrook estate clubhouse with leaders of industry, labor, and government. A partial list of visitors during the 1973-74 academic year included: H. Samuel Greenawalt, Executive Vice President, Michigan National Bank of Detroit; Robert W. Hartwell, Executive Vice President-Finance, Detroit Edison; Joseph R. Nedrow, Assistant Director, Placement and College Relations, General Motors Corporation; Arthur W. Saltzman, Manager of Centralized Industrial Relations for the General Services Division, Ford Motor Company; Alan E. Schwartz, Senior Member, Honigman, Miller, Schwartz, and Cohn.

Committees of second-year students are responsible for interviewing each visitor prior to his visit as part of a report made to the rest of the class analyzing the visitor's organization.

Transfer Credit and Course Exemptions

The module system of education in the M.S.M. program makes the transferring of whole courses for program credit difficult. In the few cases where such transferring may be appropriate, letters requesting such transfer should be sent to the chairman, School of Economics and Management Graduate Policy Committee, stating where the work was done and the name, number, and catalog description of course, when taken, grade received, and texts used.

The module system does, however, encourage the exemption of specific modules within courses, according to the qualifications of the individual student. Students must obtain module exemption forms from the School of Economics and Management office and register for the course in which the module is located. The procedure involves evaluation of the student's knowledge of the specific subject matter covered by the modules in question. The faculty responsible for teaching the specific modules review the application. An examination covering the module subject matter may be given at the discretion of the faculty member reviewing the application.

Master's Project

The guiding principle behind the master's project is that it should be a meaningful experience within the professional education goals of the M.S.M. program. This is interpreted as a project applying classroom training to a practical management problem. It must involve the collection and analysis of data in an actual organizational setting, as well as recommendations to management. It is *not* conceived as a theoretical master's "thesis." It should not be directed at a specific academic discipline, but should be considered a management problem which probably has inputs from more than one academic source, although it is recognized that one discipline may still be dominant.

Specific Procedures

1. Each student shall designate a project adviser, with his approval, as well as a second reader, who may be from *another discipline*. A copy of a two-page proposal with their signatures shall be delivered to the Graduate Program Coordinator *during the first week of the semester* in which the project course is taken. The Graduate Program Coordinator, acting in consultation with the Dean and the Graduate Committee, reserves

the right to alter assignments after discussion with the parties involved. The proposal should contain a brief description of:

- a. the problem,
- b. the expected analysis technique, and
- c. the host organization.

Faculty or students may refuse a committee assignment upon consultation with the program coordinator.

Student joint projects are acceptable if each member of the team identifies a specific aspect of the problem for which he will be responsible and writes an individual final report. Such allocations of problem areas should be identified in proposals of joint projects. Proposals involving teams of more than two members will be accepted only after careful scrutiny.

2. An interim progress report will be submitted to the Graduate Program Coordinator by the end of the 7th week of the semester in which the student has enrolled for the project. This report should also contain the signatures of the student's two advisers.
3. No projects will be accepted for satisfaction of graduation requirements for a particular semester after the *Friday two weeks prior to the last day of classes*. A project shall be deemed acceptable and complete upon obtaining the signatures of the adviser and reader on the title page. Two final copies of the project report containing these signatures shall be submitted to the Graduate Program Coordinator. One will be kept on file in the School of Economics and Management, while the other will be sent to the Office of Graduate Study.

Student Evaluation

Course grades are determined by averaging the individual module grades, weighted by length (i.e., 4, 8, 16 weeks). In addition to university grade point average requirements for graduate students (i.e., a 3.0 average), M.S.M. program standards require that a student be warned if two or more modules in a semester are graded lower than 3.0. More severe deficiencies will lead to placement on a probationary status. If improvement does not occur after such placement, the student may then be dismissed. Immediate dismissal may also take place as a result of severe deficiencies such as failure (less than 2.0) in more than one module.

A student must be progressing satisfactorily toward a degree. Such progress is defined as keeping up with standard program requirements (at least six courses per calendar year, including spring and summer sessions). Accumulating two or more "P" (Progress) grades or not taking courses as they occur in sequence may also subject a student to probation or dismissal. If a student must miss a course or a semester, arrangements should be made as far in advance as possible with the Graduate Program Coordinator or the student's adviser.

LIST OF ELECTIVE TOPICS AVAILABLE

Students should enroll in elective courses by registering for MGT 621, 630, and 631 (Management Elective I, II, III) at the appropriate point in their progression through the program (see

diagram). Depending upon student interests and faculty availability, one or more of the following topics may be offered during each elective course:

ADVANCED SYSTEMS ANALYSIS

(4 credits)

The course engages topics in the modeling, instrumentation, and control of complex systems. Particular emphasis is placed on the specification, testing, and implementation of policies in environments in which direct controls must be foregone in favor of educational control policies. Among the specific areas in which applications may be found are marketing, education, weather modification, living resource management, and energy-nutrient use management.

MARKETING AND CONSUMER BEHAVIOR

(4 credits)

Analysis of consumer behavior and its significance for market analysis. The relationship between market structure and marketing behavior.

MARKETING MANAGEMENT

(4 credits)

An in-depth study of a selected topic relevant to the management of the marketing function. Topics that may be covered include: marketing and society; advertising and the mass media; institutional marketing; distribution channel management; promotional policies. This course may be repeated when a different topic is covered.

EXTERNAL ACCOUNTING

(4 credits)

A study of the various theories underlying the presentation of information on the financial statements of the firm.

THE MULTINATIONAL FIRM AND FINANCE

(4 credits)

Analysis of the scope, structure, and environment (legal, social, political, and economic) with emphasis on management strategies of planning, marketing, location, and finance across cultural and national boundaries.

THE LEGAL ENVIRONMENT OF ENTERPRISE

(4 credits)

The objective of this course is to familiarize the student with the legal framework in which business decisions are made and the types of economic conflict and political activity that has created this framework. Topics to be covered include: contracts; anti-trust legislation; conflict resolution; and regulatory agencies.

ASSESSMENT OF ORGANIZATIONAL BEHAVIOR

(4 credits)

Use of findings and methods of various behavioral research strategies as inputs for managerial problem-solving. Comparison of case, experimental, survey, correlational, and other approaches. Issues of reliability and validity of data and research bias. Review of various methods of individual and organizational measurement devices, including industrial tests, morale surveys, etc. Practical experience in the collection and evaluation of data will be included.

LEADERSHIP AND GROUP PERFORMANCE

(4 credits)

A comprehensive examination of different theories of leadership. Emphasis on relevant empirical evidence and application of the theories to case studies.

MOTIVATION AND WORK BEHAVIOR

(4 credits)

Analysis and discussion of individual and organizational factors

affecting employee motivation, performance, and satisfaction in the work environment. Based on a review of several contemporary theories of work motivation, the course will focus primarily on the analysis of interrelationships between motivational processes and other important variables in the organizational milieu. Topics to be covered include: the role of leadership; job design; environmental variation; compensation policies; goal-setting techniques; and group influences as each affects employee attitudes and behavior. The course will aim at achieving a viable synthesis between the various theoretical approaches to the topic and the more applied concerns of the practicing manager.

LABOR-MANAGEMENT RELATIONS

(4 credits)

Analysis of management-employee relations in modern industry; public policy in labor-management areas.

OPERATIONS RESEARCH

(4 credits)

Operations research techniques are used in exploring problems selected from several areas of organizational and business analysis. Identical with MGT 442.

SIMULATION IN ECONOMICS

(4 credits)

An introduction to the use of simulation techniques in economic analysis.

HEALTH CARE ORGANIZATION

(4 credits)

The application of the tools of economic analysis to the health care industry and government health care policy. The class will examine the effects of the special characteristics of health care and the current organization of the medical services industry on the pattern of health care produced, its distribution, and the allocation of resources within the industry. Proposed changes in the current system, such as National Health Insurance, will be examined and benefit/cost analysis applied to selected public policy problems such as the public funding of medical research.

SCHOOL OF ENGINEERING

Dean:

Paul R. Paslay

Professors:

Benjamin F. Cheydleur, B.A., University of Wisconsin
David H. Evans, Ph.D., Brown University
William G. Hammerle, Ph.D., Princeton University
John Carroll Hill, Ph.D., Purdue University
Joseph D. Hovanesian, Ph.D., Michigan State University
Keith R. Kleckner, Ph.D., Cornell University
Paul R. Paslay, Sc.D., Massachusetts Institute of Technology
Howard R. Witt, Ph.D., Cornell University

Associate Professors:

David E. Boddy, Ph.D., Purdue University
Robert H. Edgerton, Ph.D., Cornell University
Glenn A. Jackson, Ph.D., University of Michigan
Gilbert L. Wedekind, Ph.D., University of Illinois
Tung H. Weng, Ph.D., University of Missouri
Michael J. Wozny, Ph.D., University of Arizona

Assistant Professors:

Donald R. Falkenburg, Ph.D., Case Western Reserve

Adjunct Professors:

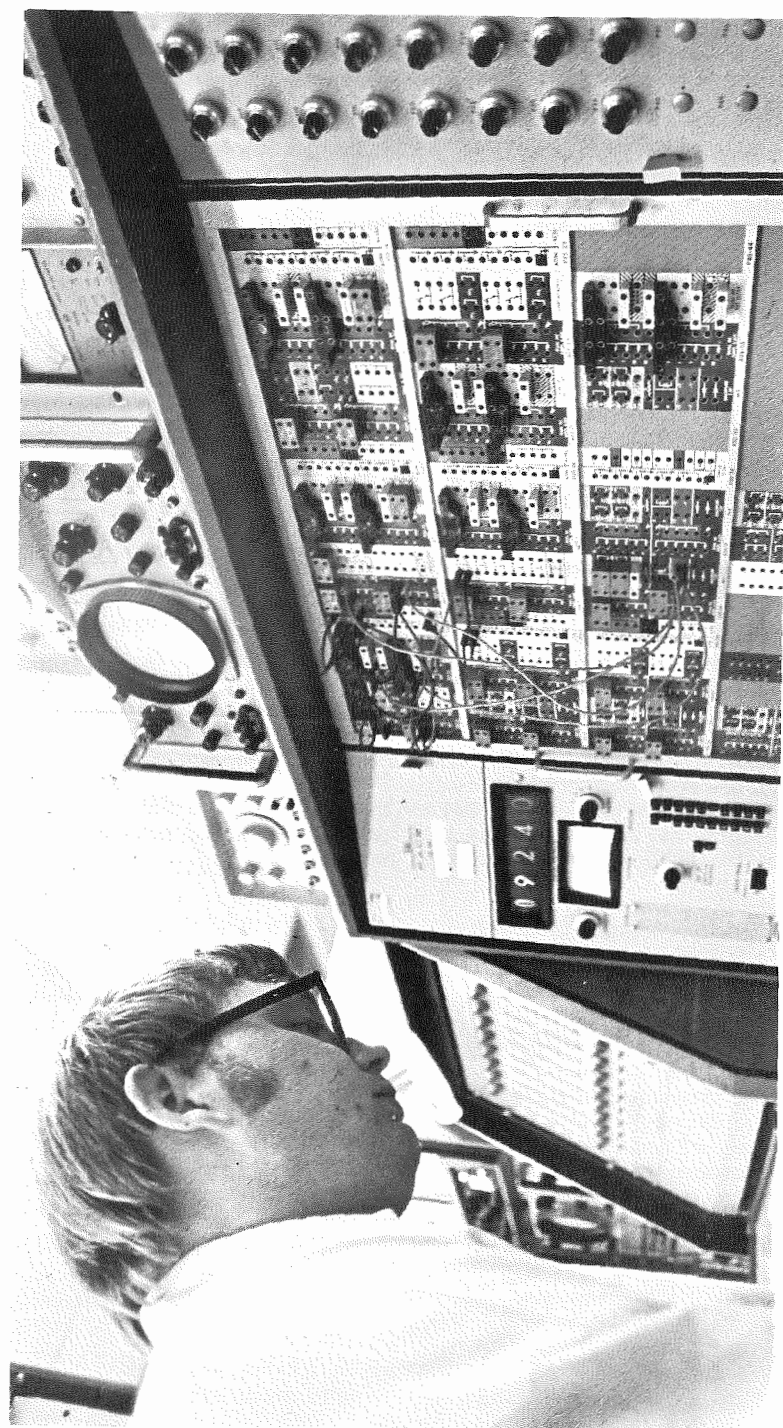
John G. Gievers, Ph.D., Technical University Darmstadt
Ralph M. Grant, Ph.D., Technical University of Netherlands
Kenneth A. Meade, Sc.D., (Honorary)
Eastern Michigan University
Keeve M. Siegel, M.S., Rensselaer Polytechnic Institute

The School of Engineering offers work leading to the Master of Science and Doctor of Philosophy degrees in engineering, as well as the Professional Development degree for practicing engineers.

The School is housed in Dodge Hall of Engineering, a modern facility with extensive laboratories for research and design studies. Virtually all equipment is new and available for student projects. Established laboratories cover coherent optics, experimental stress analysis, heat transfer, system simulation, communications and control, mechanical and electrical properties of materials, and thin-film microelectronics. Special facilities exist for research in two-phase flow phenomena, optical data-processing, holography, p-n junction devices, and system simulations. All students have access to the School's IBM 1130 digital computer and the University's Burroughs B5500 time-sharing system, as well as the several analog computers operated by the School. In addition, there is a large hybrid machine ideally suited to simulations of complex systems. All of these facilities are complemented by fully-equipped and staffed electronics and machine shops.

THE MASTER OF SCIENCE IN ENGINEERING

Students may earn the Master of Science in engineering with concentrations in systems engineering, energy transport, and elec-



tromagnetic and optical engineering. The electromagnetic and optical engineering concentration places special emphasis on properties of materials, such as electronic properties of semiconductors and optical testing of strength of metals. Minor concentrations may be arranged in physics and mathematics. Students whose special interests cross the boundaries of these areas may arrange interdisciplinary courses of study. Programs ordinarily do not require a thesis; emphasis is rather placed on a design project carried out by the individual or by a small group. The object of the Master of Science program is to provide participants with broad training in an area of engineering rather than a narrow apprenticeship in a specific research area. Specialized research is more appropriately delayed for doctoral thesis preparation.

Courses are arranged in the late afternoon and early evening for the convenience of students employed in industry. Such part time students should be aware, however, of the very real demands placed on them by graduate studies and should keep outside work commitments within reasonable bounds.

Admission to Course

The program leading to the degree of Master of Science in engineering is designed to accommodate students with a wide variety of undergraduate backgrounds. A bachelor's degree in physics, mathematics, or any recognized field of engineering represents excellent preparation; a degree in any other field of science is also acceptable, but a student presenting such a degree should plan to spend additional time in residence in order to gain proficiency in the fundamentals of engineering.

Admission to master's study in engineering is selective; applicants should have upper-quartile rank. In addition to the bachelor's degree, an applicant should present academic transcripts and recommendations from two members of his undergraduate department who are familiar with his level of accomplishment and promise. These recommendations form a most important part of the admission credentials.

Requirements for the Degree

A student's progress toward the MS degree is guided by his Master's Committee, a group composed of three School of Engineering faculty members, two selected by the student and one appointed by the Dean of Engineering. Each student must form a Master's Committee during his first semester of enrollment. Failure to do so may result in additional semesters of work to complete degree requirements.

The master's degree in engineering is never conferred for completing a random selection of courses; a planned program is essential. The basic degree requirement is successful completion of at least 32 credits of graduate courses in engineering and related areas of the sciences, mathematics, or management, the whole to form an integrated program of study proposed by the student and approved in advance by his Master's Committee.

Students are encouraged to propose programs which best suit their special interests, subject only to the following general requirements:

(1) Each candidate for the degree of Master of Science shall be required to demonstrate proficiency in independent design or

research by successfully completing a master's thesis or project. Ordinarily this requirement is satisfied by completion of 4 to 12 credits in EGR 509. In special cases, a student may be exempted from EGR 509, but he must still satisfy the design-research requirement. In such cases the burden of proof of satisfaction of this requirement shall rest with the student, the manner of which is outlined in paragraph (3) below.

(2) It is required of each student taking EGR 509 to submit to his project director three copies of an engineering report describing all facets of the investigation. One copy shall remain with the project director; the other copies will be placed in central files maintained by the Dean of the School of Engineering and the Office of Graduate Study for perusal by any interested party. Detailed information concerning the format of the report is available in the Office of the School of Engineering. In addition, a project director will usually require a student to deliver a short oral presentation of his work before interested faculty and students.

(3) In some instances, a candidate may feel that he has already demonstrated proficiency in independent research or design at the master's level by virtue of a project completed previously while he was employed as a practicing engineer. Such a student should submit to his Master's Committee for its consideration a detailed report of the project, with reprints of any related publications. If the project was a joint effort, the report should clearly indicate the extent of the candidate's role in the undertaking. If the Master's Committee judges the effort to be of magnitude and at a level commensurate with standards set for work leading to the degree of Master of Science in engineering at Oakland University, it may then certify the candidate as having satisfied the design-research requirement. As an aid in its deliberations, the Committee may wish to request of the student additional substantiation of his case. (Graduate credit for project work is awarded only for participation in a satisfactorily completed undertaking directed by a faculty member of Oakland University.)

(4) Of the 32 credits required for the degree, at least 20 must be earned in courses offered by the School of Engineering. Graduate credits are awarded only for courses numbered 500 and above.

(5) A student may request transfer credits, not to exceed 12 semester hours, for work done at another institution. A petition, endorsed by the Master's Committee, should be submitted to the Engineering Graduate Committee, and transcripts and catalog descriptions of the courses for which credit is requested should accompany the petition. In all cases, it shall be the responsibility of the candidate to demonstrate that the work done is relevant and complementary to his Oakland program.

(6) Full time students may register for as many as 13 credits per semester, and students holding assistantships in the School of Engineering may register for as many as 9 credits per semester. Students with high academic standing may be permitted to register for an additional course by special petition. (See paragraph 7 below.)

(7) In extraordinary cases, a student may petition to be

relieved of a degree requirement. A petition form should be obtained from the Office of the Dean of the School of Engineering; it should then be presented to the Master's Committee for endorsement and submitted to the Engineering Graduate Committee for action.

THE DOCTOR OF PHILOSOPHY IN ENGINEERING

Students may earn the Doctor of Philosophy degree in the field of systems engineering. The goal of the doctoral program is to train engineering practitioners who have a broad competence that crosses the boundaries of traditional engineering disciplines and who are capable of dealing with complex, large-scale problems. The field of systems engineering has evolved into a blending of disciplines that is well-suited for dealing with such concerns as energy production, resource management, transportation systems planning, and highway safety, and it is in this field that Oakland's School of Engineering is concentrating its efforts at the Ph.D. level. The Ph.D. program in systems engineering is specifically intended for students who plan careers in industrial or governmental research and development laboratories or problem-oriented agencies. Students can begin doctoral study on a part time basis, availing themselves of late afternoon or evening courses while maintaining full time employment in local industry. However, later phases of study and research will require full time devotion to the program, and the student should plan to spend at least three semesters engaged in full time study.

Admission to Course

The Ph.D. program is designed to accommodate students with academic backgrounds in engineering, mathematics or the physical sciences. Superior performance in a master's program in any of these areas represents excellent preparation. Students with outstanding undergraduate records may apply directly for admission to the doctoral program, but normally a master's degree from an accredited institution is a requirement for admission. Admission is highly selective; an applicant should present transcripts of all previous academic work and recommendations from three faculty members of his most recent study program who can evaluate his scholarly achievement and promise. Foreign applicants must submit scores from the Graduate Record Examination Aptitude and Advanced Engineering Tests.

Requirements for the Degree

Students seeking the Ph.D. degree pursue a unified program of course study and thesis research. The entire program, including the specific array of courses taken by a particular student, is under the direction of a five member Advisory Committee. This committee consists of three faculty members, chosen by the student, one of whom must represent a department outside the School of Engineering and two additional members appointed by the Dean of Engineering. One member of the committee is designated as chairman. The entire committee must have the approval of the Dean of Engineering and the Dean of Graduate Study, and must be formed during the student's first semester of enrollment.

The following general requirements apply to all candidates for the doctorate:

(1) Residence

Each candidate must devote a minimum of three semesters to full-time pursuit of his doctoral study program. However, these semesters need not necessarily be consecutive or spent in residence on the campus although this is usually the case. If the student's employer and faculty advisory committee are able to reach agreement that his thesis research will constitute his complete job assignment for a semester then, with the concurrence of the Dean of Engineering, that semester may be counted as spent in full-time study.

(2) Credit

A minimum of 56 credits must be earned for coursework beyond the bachelor's degree, the normal full-time load being 12 credits per semester. Students who have earned course credits in a master's degree program at Oakland or another university may petition to have these credits applied toward the 56. The student's Advisory Committee will evaluate his prior work and allow Ph.D. credits for those courses which are relevant to his proposed Ph.D. course of study. In all instances, a candidate must complete at least 20 credits of coursework at Oakland University.

(3) Qualifying Examination

After being admitted to the Ph.D. program and before earning more than 12 credits toward the Ph.D. degree, the student must pass a qualifying examination administered by the Advisory Committee.

The qualifying examination will have both oral and written components and covers basic engineering concepts. The purpose of this examination is to assess the student's facility with the analytical reasoning essential to later Ph.D. research. The examination is scheduled in advance, and any member of the University Faculty may attend and participate in the examination. The Advisory Committee may ask a student to repeat the qualifying examination in a subsequent semester if his performance is deemed inadequate. No additional repeat examinations are permitted.

(4) Thesis

Each candidate will submit a thesis to his Advisory Committee. The thesis must be the candidate's own work and must constitute a contribution to knowledge in his field of endeavor.

A rough draft of the thesis must be submitted to the Advisory Committee for its review, modification, and approval before the final copies of the thesis are prepared and approved. Final copies must conform to standard University style. Guidelines for preparation of the thesis may be obtained from the Office of Graduate Study.

(5) Thesis Proposal Review

As soon as a candidate has agreed with his Advisory Committee Chairman on a specific thesis research topic, he should prepare a written Thesis Proposal. This document should contain a formulation of the problem, the background work leading to the formulation and a plan of attack for the subsequent research. The candidate must then make an oral presentation of his proposal before his Advisory Committee and any other interested faculty, at which time the Committee may question him on his preparedness to carry out the research. Approval by the Advisory Committee of the Thesis Proposal permits the candidate to register for thesis research.

(6) Final Examination

Each Ph.D. degree candidate must satisfactorily defend his thesis in a final oral examination administered by the Advisory Committee. The examination is taken upon certification by the Advisory Committee that the thesis is ready for final review. This examination is scheduled in advance, and any member of the University Faculty may attend and participate in the examination. The Committee may wish to invite additional outside referees to participate and is encouraged to do so. At the Committee's option, one re-examination may be permitted a candidate who fails to pass the final examination.

PROFESSIONAL DEVELOPMENT IN ENGINEERING

No one is more keenly aware than is the practicing engineer of the technological knowledge explosion the profession is experiencing. (The current half-life of technology is about six years.) New developments occur daily, and it is essential that he devote time on a continuing basis to bring himself up-to-date regarding advances in his field. Yet, the pressures of his job often leaves very little time for serious study. Attending short courses and one day institutes can provide overviews of new developments, but a more formal and extended program is required if the engineer is to gain a real working knowledge of the new technology—knowledge which can be applied on the job. Professional development in engineering is the continuing education process by which the practicing engineer remains at the forefront of his field. To help in this process, Oakland's School of Engineering offers a new degree program in technical updating—the Professional Development Degree program.

The Professional Development program is designed for the practicing engineer who wishes to familiarize himself with modern practical engineering analysis and design but does not choose to undertake the rigor of a master's program. The program consists of an integrated sequence of six 12-week courses, each offered during evening hours. A student can complete the sequence in three to six semesters, depending upon his available time. Successful completion of the program is recognized by the awarding of a Professional Development in Engineering Degree. This new degree, not a certificate, for the first time brings appropriate recognition to engineers who have undertaken professional renewal and updating.

Admission

Admission to the Professional Development Program is open to anyone holding a bachelor's degree in engineering from an accredited institution and earned not more recently than five years ago. No additional requirements are imposed.

Requirements for the Degree

The only degree requirement is successful completion of at least 24 credits in specially-designed Professional Development courses. (See page 104.) Professional Development courses are divided into groups—updating (Group I) and upgrading (Group II). Students normally take three courses in each group. Group I courses are designed to provide the student with broadly-applicable analytical and evaluative skills. Group II courses are offered in various technical fields and are designed to employ the skills which have been developed toward the solution of practical design problems.

COURSE OFFERINGS

(One credit hour is equal to one semester hour.)

EGR 500 GRADUATE SEMINAR (1 credit)

Lecture and discussions conducted by members of the faculty, graduate students, and invited speakers from industry and other universities. Emphasis on current research interests of the School.

EGR 505 SPECIAL TOPICS IN ENGINEERING (4 credits)

Advanced study in special areas. May be taken more than once. Offered variously as a formal course. May always be arranged by special agreement between students and a particular faculty member.

EGR 509 ENGINEERING DESIGN PROJECT (4 to 12 credits)

A project requiring independent design effort by the student, with theoretical studies first and subsequently design of the appropriate hardware. Laboratory and computer studies will be included.

EGR 510 INTRODUCTION TO CONTINUUM MECHANICS (4 credits)

Foundations in vector and tensor fields, kinematics of deformation, measures of strain and analysis of stress, equations of motion, compatibility conditions, constitutive equations, thermodynamics of deformation, infinitesimal elasticity, ideal fluids, ideal elastoplasticity and linear viscoelasticity.

EGR 520 SYSTEM MODELING AND ANALYSIS (4 credits)

A unified approach to the modeling of mechanical, electrical, thermal and fluid systems. Forms for multi-degree of freedom systems; analytical, numerical and analog computer solutions. The approximation of systems described by partial differential equations. Linearization, stability, controllability and observability.

EGR 521 ENGINEERING OPTIMIZATION (4 credits)

The optimization of functions and functionals. Maxima and minima of functions of one and several variables; constraints and Lagrange multipliers; parameter optimizations; functionals under constraints and with bounded forcing—the Pontryagin Maximum principle; the gradient method.

EGR 530 ENGINEERING PROBABILITY AND STATISTICS (4 credits)

Fundamental probability and statistics with an introduction to stochastic processes. Applications to quality control, vehicular and telephone traffic, tolerancing, analysis of data, simulations with stochastic elements.

EGR 531 OPERATIONS RESEARCH (4 credits)

Deterministic and stochastic methods of operations research. Linear, non-linear, and dynamic programming. Markov processes, queueing theory, analysis of stochastic systems. Applications to allocation of resources, production and inventory scheduling and control, congestive systems, statistical tolerancing.

EGR 535 LARGE SCALE SYSTEMS (4 credits)

System management, PERT, CPM, computer simulation and techniques such as game theory, traffic flow theory, etc. Each term a specific system study is conducted and major emphasis is on preparation of the report of this study.

EGR 540 ELECTROMAGNETIC SIGNALS AND WAVES (4 credits)

The electrostatic, magnetostatic, and electromagnetic field; electromagnetic waves, guided waves, radiation, diffraction theory.

EGR 548 THERMAL ENERGY TRANSPORT (4 credits)

The basic concepts, properties, and descriptions of the three fundamental modes of heat transfer (conduction, convection, and thermal radiation); theoretical, numerical, and analog methods of analysis of steady, transient, single- and multi-dimensional problems.

EGR 549 FLUID TRANSPORT (4 credits)

A study of the fundamentals of fluid mechanics and their applications; potential flow of inviscid fluids, laminar and turbulent boundary layer theory compressible flow; similarity, modeling, and dimensional analysis.

EGR 550 COHERENT OPTICS (4 credits)

Theory and design of optical data processing systems. Two-dimensional Fourier analysis; scalar diffraction theory; interference and partial coherence; Fourier transforming and imaging properties of lenses; analysis of coherent imaging systems; optical spatial filtering, holography.

EGR 551 CONVECTIVE TRANSPORT PHENOMENA (4 credits)

The fundamental equations expressing conservation of mass, momentum, and charge; ideal and viscous fluids with mass transfer. Approximation techniques for solution of the conservation equations. Convective transfer of momentum, mass and charge; turbulent transport processes.

EGR 552 THERMAL TRANSPORT PHENOMENA (4 credits)

The fundamental continuum equation expressing conservation of energy; radiation and conduction heat transfer; multi-dimensional and one-dimensional unsteady conduction problems. Forced and natural convective heat transfer; thermal boundary layer theory; two-phase flow.

EGR 553 FLUID AND THERMAL SYSTEMS (4 credits)

A study of various systems involving fluid and thermal phenomena. Emphasis is placed upon systematically applying fundamental integral, differential and lumped modeling techniques as a means of formulating theoretical descriptions of such systems for the purposes of analysis, design and optimization. Examples are taken from energy conversion, transport processes, pollution control and measurement problems.

EGR 555 ENERGY AND INFORMATION SYSTEMS (4 credits)

Energy and entropy considerations of conservative and non-conservative systems; information and energy transfer in transducers and sensors. Modeling of thermodynamic systems. Availability analysis of energy conversion and transformaton systems. Introductory irreversible thermodynamics.

EGR 561 ADVANCED MECHANICS OF MATERIALS (4 credits)

Advanced topics in mechanics, such as beams on elastic foundations, curved and composite beams. Theory of plates and shells, torsion of non-circular cross-sections, thick-wall cylinders, contact stresses, stress concentrations. Energy methods and introduction to stability.

EGR 562 MECHANICAL PROPERTIES OF MATERIALS (4 credits)

True stress-strain properties of real materials with emphasis on defect structures in metals. Plastic deformation and fracture, dislocations, mechanical twinning and slip phenomena. Theories of yield strength, fracture and fatigue behavior. Work-hardening theories for metals, strengthening mechanisms in solids.

EGR 572 ELECTRONIC PROPERTIES OF MATERIALS (4 credits)

Crystal structure of important electronic materials, band theory of solids; transport phenomena; particle statistics; equilibrium distribution of carriers in semiconductors; electrical conductivity; optical and thermal effects in semiconductors; introduction to dielectric and magnetic properties.

EGR 573 SOLID-STATE ELECTRONIC DEVICES (4 credits)

Non-equilibrium carrier densities, transport of excess carrier densities. p-n junctions and devices, interface studies, MOS structures, fundamentals of micro-electronics and integrated circuits. Fabrication of alloy junction, diffused junction and tunnel diodes, and thin semiconducting films.

EGR 580 NUMERICAL METHODS IN ENGINEERING (4 credits)

Practical numerical methods in engineering with emphasis on techniques appropriate to digital computation. Roots of equations; interpolation; numerical integration and differentiation; linear equations and the eigenvalue problem; ordinary and partial differential equations.

EGR 581 HYBRID COMPUTATION AND SIMULATION (4 credits)

Hybrid computing techniques for engineering problems. Parallel logic for iterative problems; analysis using z-transform; errors and compensation; split simulation and function generation. Applications to solution of partial differential equations, optimization and parameter identification.

EGR 585 SWITCHING THEORY (4 credits)

Algebraic symbolization for nets of binary switched circuits. Computation of nonredundant expansions by matrix methods with translation into laboratory devices using building-block computer elements. Introduction to sequential switching decomposition for control and programming of systems.

EGR 586 COMPUTER ARCHITECTURE (4 credits)

Models of information processors; computer logic and organization. Specification of instructions; addressing and format; time sharing controls; hardware for facilitating operating systems; micro-control; input/output and network interfacing.

EGR 609 DOCTORAL THESIS RESEARCH (4 to 12 credits)

Directed research toward the thesis.

Related Courses

MTH 531 MATHEMATICAL METHODS IN ENGINEERING I (4 credits)

Vector spaces and matrices, eigenvalue problems, applications to systems of differential equations, numerical methods in linear algebra. Infinite series, Taylor's series, power series methods in differential equations.

MTH 532 MATHEMATICAL METHODS IN ENGINEERING II (4 credits)

Functions of several variables, vector field theory, partial differential equations, boundary value problems, Fourier series, and Fourier integrals.

CIS 582 INTRODUCTION TO COMPUTER PROGRAMMING AND PROBLEM SOLVING (4 credits)

An introduction to computer programming and problem solving using the languages BASIC and FORTRAN. Emphasis is placed on applications in elementary statistics. This course is intended for students in education. Not open to engineering and computer science majors.

Prerequisite: two years of high school mathematics are strongly recommended.

PROFESSIONAL DEVELOPMENT COURSES

EGR 901 ENGINEERING SYSTEMS ANALYSIS (4 credits) (Group I)

An overview of modern modeling and analysis techniques for physical systems.

EGR 902 DIGITAL METHODS (4 credits) (Group I)

The formulation of problems for machine analysis. Constraints posed by machine organization and programming languages.

EGR 903 ANALOG AND HYBRID METHODS (4 credits) (Group I)

System simulations involving analog and mixed analog-digital computers.

Group II courses are arranged according to the special interests of professional development students. Courses already developed include:

EGR 905A MANAGING PROFESSIONAL PERSONNEL (4 credits)

The philosophy, methods, and tools of directing a group of technical professionals.

EGR 905B ADVANCED MECHANICS OF MATERIALS (4 credits)

Comparative methods of failure analysis. Designing for fail-safe operation.

EGR 905C EXPERIMENTAL STRESS ANALYSIS (4 credits)

Use of modern x-ray, magnetic and laser techniques of non-destructive materials testing.

EGR 953 FLUID AND THERMAL SYSTEMS (4 credits)

A systems approach to the modeling and design of fluid and thermal energy transport systems.

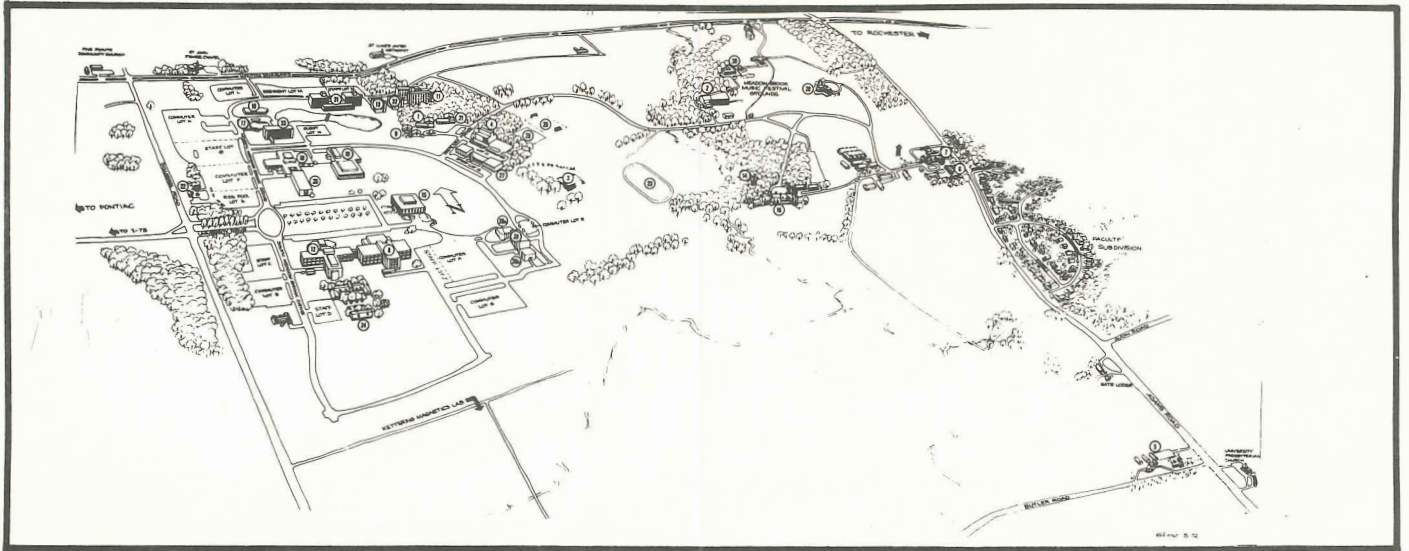
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CAMPUS MAP LEGEND

- 1 Anibal House
- 2 Baldwin Memorial Pavilion
- 3 Baseball diamond
- 4 Central Heating Plant
- 5 Child Care Center
- 6 Club House
- 7 Continuum Center
- 8 Dodge Hall of Engineering

- 9 Fitzgerald House
- 10 Graham Health Center
- 11 Hamlin Hall
- 12 Hannah Hall of Science
- 13 Hill House
- 14 Knole Cottage
- 15 Kresge Library
- 16 Meadow Brook Hall
- 17 Meadow Brook Theatre

- 18 North Foundation Hall
- 19 Oakland Center
- 20 Paula and Woody Varner Hall
- 20a Varner Recital Hall
- 20b Studio Theatre (ADA)
- 21 Pryate House
- 22 Public Safety and Gate House
- 23 Running track
- 24 S E T Barn Theatre

- 25 Soccer field
- 26 South Foundation Hall
- 27 Sports and Recreation
- 28 Sunset Terrace
- 29 Tennis Courts
- 30 Trumbull Terrace
- 31 Vandenberg Hall
- 32 Van Wagoner Hall
- 33 Wilson Hall

