

**graduate
catalog
issue**

Mrs. D
DANA

1972-73



**YOUNGSTOWN
STATE
UNIVERSITY
BULLETIN**

**GRADUATE
CATALOG ISSUE**

1972-73

**Effective September 21, 1972
Youngstown, Ohio**

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ACADEMIC ADMINISTRATION

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The School of Business Administration
Robert L. Miller, M.B.A., Dean
The School of Education
Donald W. Robinson, Ph.D., Dean
The William Rayen School of Engineering
M. Jean Charignon, Ph.D., Dean
The Dana School of Music
Charles H. Aurand, Jr., Ph.D., Dean
The Technical and Community College
Nicholas Paraska, Ph.D., Dean

THE GRADUATE SCHOOL

409 Lincoln Project
Karl E. Krill, Ph.D., Dean

THE GRADUATE COUNCIL

Frank A. D'Isa, Professor of Mechanical Engineering
Sanford N. Hotchkiss, Professor of Psychology
Ward L. Miner, Professor of English
Duane Sample, Associate Professor of Music
Morris Slavin, Professor of History
Dumitru Teodorescu, Professor of Management
Clyde V. Vanaman, Professor of Education
Paul D. VanZandt, Professor of Biology

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Graduate Faculty Membership

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Ronald L. Gould, Music	William O. Swan, Education
	Christopher J. Sweeney, Psychology

Scholarships, Assistantships, and Awards

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Peter W. von Ostwalden, Chemistry	Matthew Siman, Electrical Engineering
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	Dwight G. Watkins, Education

Curriculum

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George L. Almond, Marketing	Thelma S. Miner, English
Ralph G. Crum, Civil Engineering Technology	Lawrence A. DiRusso, Education
Dale W. Fishbeck, Biology	Mark F. Walker, Music

Policy

Duane Sample, Music (Chairman)	Richard W. Jones, Metallurgical Engineering
Arthur R. Curran, Management	Lauren Schroeder, Biology
Thaddeus M. Dillon, Mathematics	Louis E. Hill, Education

Academic Calendar 1972-1973

FALL QUARTER 1972

Aug. 18	Fri.		Last day to apply for admission for Fall Quarter
Sept. 21	Thurs.	0800	Classes Begin
Sept. 27	Wed.	1900	Last day to add a class
Sept. 30	Sat.	1100	Last day to apply for Fall Quarter Graduation
Nov. 1	Wed.	1900	Last day for withdrawing with a W
Nov. 22	Wed.	2300	Thanksgiving Vacation Begins
Nov. 27	Mon.	0800	Thanksgiving Vacation Ends
Dec. 1	Fri.		Last day to apply for admission for Winter Quarter
Dec. 4	Mon.	0800	Final Examinations Begin
Dec. 9	Sat.	1430	Final Examinations End

WINTER QUARTER 1973

Jan. 2	Tues.	1650	Classes Begin
Jan. 8	Mon.	1900	Last day to add a class
Jan. 13	Sat.	1100	Last day to apply for Winter Quarter Graduation
Feb. 12	Mon.	1900	Last day for withdrawing with a W
Feb. 23	Fri.		Last day to apply for admission for Spring Quarter
Mar. 12	Mon.	1700	Final Examinations Begin
Mar. 17	Sat.	1430	Final Examinations End
Mar. 24	Sat.	1000	Winter Commencement

SPRING QUARTER 1973

Mar. 26	Mon.	0800	Classes Begin
Mar. 31	Sat.	1100	Last day to add a class
Mar. 31	Sat.	1100	Last day to apply for Spring Quarter Graduation
May 5	Sat.	1100	Last day for withdrawing with a W
May 18	Fri.		Last day to apply for admission for Summer Quarter
May 28	Mon.		Legal Holiday—No Classes
June 4	Mon.	0800	Final Examinations Begin
June 9	Sat.	1430	Final Examinations End
June 16	Sat.	1000	Spring Commencement

SUMMER QUARTER 1973

June 14	Thurs.	0800	Classes Begin—Entire Summer Quarter and First Term
June 18	Mon.	1900	Last day to add a class—First Term

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June 20	Wed.	1600	Last day to add a class—Entire Summer Quarter
June 25	Mon.	1900	Last day to apply for Summer Quarter Graduation
July 3	Tues.	1900	Last day for withdrawing with a W—First Term Classes
July 4	Wed.		Legal Holiday—No Classes
July 19	Thurs.	2200	First Term Ends (Final Examinations for First Term Classes are given during Last Scheduled Class Period)
July 23	Mon.	0800	Second Term Begins
July 25	Wed.	1600	Last day for withdrawing with a W—Entire Summer Quarter Classes
July 27	Fri.	1600	Last day to add a class—Second Term
Aug. 10	Fri.	1600	Last day for withdrawing with a W—Second Term Classes
Aug. 22	Wed.	0800	Final Examinations Begin—Entire Summer Quarter Classes (Final Examinations given during Last Scheduled Class Period)
Aug. 24	Fri.	0800	Final Examinations Begin—Second Term Classes (Final Examinations given during Last Scheduled Class Period)
Aug. 24	Fri.	2200	Second Term and Entire Summer Quarter Ends
Aug. 31	Fri.	1000	Summer Commencement

Times provided above are based on the 24-hour system, in which the day begins at midnight and hours are numbered consecutively through 2400. Thus, 8:00 a.m. is 0800, and 8:00 p.m. is 2000.

All registration is by appointment only and is concluded prior to the beginning of classes for each quarter.

General Information

Youngstown State University

Youngstown State University is located in downtown Youngstown, a major industrial center in northeastern Ohio midway between Pittsburgh and Cleveland.

Youngstown State University had its beginning in 1908 with the establishment of the School of Law of the Youngstown Association School, sponsored by the Young Men's Christian Association.

In 1920, the State of Ohio empowered the school to grant the degree Bachelor of Laws; in the same year the school offered a four-year course in business administration. In 1921, the school changed its name to The Youngstown Institute of Technology, and liberal arts classes were offered, in the evening, for the first time.

In 1927, the College of Arts and Sciences, offering daytime classes for the first time, was established. In 1928, the Institute changed its name to the Youngstown College, and in 1930, the College conferred the degree Bachelor of Arts for the first time.

Dana's Musical Institute, founded in nearby Warren in 1869, became the Dana School of Music of the College in 1941. In 1946, the engineering department, organized several years before, became the William Rayen School of Engineering; two years later the business administration department became the School of Business Administration; and in 1960, the department of education became the School of Education.

In 1944, the trustees of the Young Men's Christian Association transferred control of the institution to members of the Corporation of Youngstown College, and in 1955, the corporation was rechartered as The Youngstown University. In 1967, the University joined the Ohio system of higher education and the name was changed to Youngstown State University. A Board of Trustees of nine members was appointed by the Governor with concurrence by the Senate. As in the case of other state-assisted institutions in the Ohio higher education system, the University is also responsible to the Ohio Board of Regents.

From 1931 to 1966, Dr. Howard W. Jones, now president emeritus, served as chief executive of the University. In September 1966, he was succeeded by Dr. Albert L. Pugsley, former administrative vice

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president at Kansas State University. Dr. Pugsley was inaugurated in November 1966 as the University's second president.

The University offers complete curriculums in the liberal arts and in many technical and professional undergraduate fields. The degrees Bachelor of Arts, Bachelor of Engineering, Bachelor of Music, Bachelor of Science, Bachelor of Science in Education, and Bachelor of Science in Business Administration are granted. A rapidly expanding selection of two-year programs leading to the degrees Associate in Arts, Associate in Applied Business, and Associate in Applied Science is offered in the Technical and Community College, established in 1968. The University is accredited by the North Central Association of Colleges and Secondary Schools and by appropriate professional accrediting bodies. A co-educational institution, it had an enrollment of 300 students in 1930, grew to 2,000 in the 1940's, tripled by the 1950's, reached 10,000 in the mid-sixties, and recorded nearly 15,000 in the fall of 1971.

Equal Opportunity Practices

In the operations and activities of Youngstown State University there shall be no discrimination on the basis of race, color, sex, religious belief, country of national origin, or ancestry. This policy shall apply to employment as well as all operational aspects of the University involving students, faculty, the use of University buildings and other facilities, and to promotion or discharge of members of faculty or other employees.

The Campus

During its earlier years the institution had a number of homes. Starting in the old Central Y.M.C.A. building, it occupied various sites on Wick Avenue until the completion of Jones Hall in 1931. Additional buildings have been constructed and nearby properties converted to University use, so that today the campus extends through much of an area four blocks long and three blocks wide. In 1952 and 1953 the Library and the adjoining John Tod Hall were built; in 1959 the Science Building; and in 1962 Central Hall Annex, housing the Bookstore.

In addition to the 23 major buildings already in use on the campus, the University is currently engaged in a six-year multi-million dollar campus development program. Now under construction is a new Library capable of housing one-half million volumes, an addition to the existing Kilcawley Center, a music and fine arts building, a Technical and Community College building, classroom buildings, and other related structures.

GENERAL INFORMATION

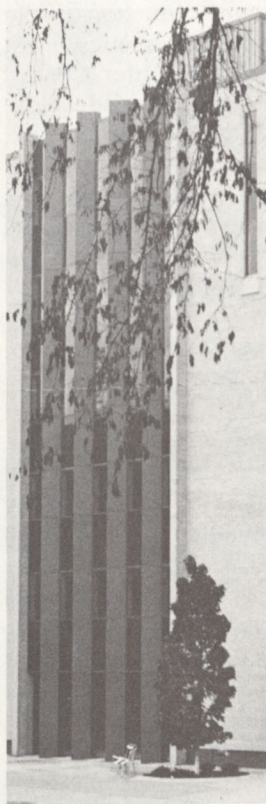
The first major step in the development program was the completion in 1966 of the Kilcawley Student Center, which provides 89,000 square feet of floor space. The building contains dining and snack bar facilities, a large student lounge, faculty lounge, meeting rooms, a dormitory unit for 210 men, and space for numerous other student activities.

In 1967, the Ward Beecher Science Hall was completed, bringing the total floor space to 132,000 square feet. This structure contains laboratories, classrooms, and offices for chemistry, biology, physics, geology, and astronomy. It also features four large lecture halls and a planetarium classroom. The planetarium is the largest in Ohio in seating capacity (126 seats), and ranked 18th in size in the country at the time of completion.

The University opened its Engineering Science Building in 1968. This building, with a floor space of 171,000 square feet, houses the Rayen School of Engineering, the Department of Mathematics, most of the Technical and Community College, and the Computer Center. There are 48 laboratories, 30 classrooms, eight research and development laboratories, office space for twelve department chairmen and associated faculty and staff members, and an auditorium seating 288. The structure contains a fluid flow laboratory that extends two stories, a chemical engineering chamber that extends three floors to accommodate absorption and distillation equipment, and a "floating floor" in the computer room to eliminate vibration from the heavy machines and from the outside.

In September 1970, the Lincoln Project building, made possible by The University Foundation, Inc., was dedicated. The six-story structure houses the School of Business Administration, the offices of the Graduate School, the Black Studies office, the Department of Sociology and Anthropology, the office of Campus Planning, and the office of Physical Plant. In addition to ample office space, the 59,000 square feet of floor space provides 34 classrooms, two seminar rooms, and a lecture hall with 96 seats.

Beehly Physical Education Center, the newest of the University's major structures, was completed early in 1972. The building contains some 198,000 square feet of floor space and houses the Department of Health and Physical Education and the Athletic Department. Its facilities include a gymnasium with spectator seating for nearly 6,000, and an Olympic-size swimming pool. There are 17 classrooms including laboratories for health research and kinesiology; separate gymnasiums for wrestling, weight lifting, gymnastics, and physical education for the handicapped; handball and squash courts; and a rifle range.



FACILITIES AND SERVICES

The Library

The Youngstown State University Library is a centralized facility which serves all departments. At present it contains more than 275,000 volumes and 3,200 periodical subscriptions, as well as 275,000 units in microform. Study carrels in each aisle of the Library's open stacks allow the student to work in the area of the subject he is studying. Built-in display cases in the halls provide places for exhibitions of various kinds, and the Purnell Room on the third floor is a browsing and smoking room. Coin-operated book copying machines are on each floor.

The main building of the Public Library of Youngstown and Mahoning County is on Wick Avenue at Rayen Avenue near the University campus.

The Computer Center

Another centralized facility, located in the Engineering Science Building and servicing the entire University, is the Computer Center. Under an unusual arrangement, the Center operates a pair of computers as a unit under the Attached Support Processor (ASP) system: an IBM 360/40 computer serves an IBM 360/50 in an input-output capacity via a direct cable connection. These computers are served by a battery of peripheral equipment: disk memories, magnetic tape memories, card readers, high-speed printers, paper tape reader, card punch, remote typewriter terminals, and remote television terminals. Access to the computers is direct at the central site or by remote terminal. In most cases, the graduate student will be able to use Computer Center services in connection with his course work or special research projects.

The Bookstore

The Youngstown State University Bookstore, temporarily located at 570 Fifth Avenue, sells required texts, materials, and supplies. In addition, because of their value as collateral reading, the Bookstore stocks in limited quantities a wide selection of standard works in inexpensive editions. Should a selection not be available, the Bookstore will order it upon a suitable down payment. There are other stores in the Youngstown area servicing the University that will add variety to available material. While the Youngstown State University Bookstore does not attempt to compete with these stores, it does carry a selection of personalized soft goods and specialty items. The aims of the Youngstown State University Bookstore are predicated on service to students, faculty and staff.

Health Service

A Health Service Office is maintained by the University for the purpose of providing emergency medical care to students while they are on campus. The cost of the service is included in the general fee; however, all additional treatment by non-University physicians, clinics, or hospitals must be paid for by the student. Any accident which results in injury to the student involved should be reported to the Health Service Office within twenty-four hours.

A voluntary, group accident and sickness insurance program specifically written to meet the needs of University students is available at the time of initial registration for each academic year. The program is underwritten by the Continental Casualty Company of Chicago, Illinois, and administered by the McElroy-Minister Company of Columbus, Ohio. A brochure explaining this program is available at the Student Affairs Office and at the Bursar's Office. All foreign students who are not permanent residents of the United States and all residents of the Kilcawley Men's Residence Hall are required to participate in this or a comparable program of Health and Accident Insurance during their entire period of enrollment at Youngstown State University.

Placement Service

With the cooperation of the Bureau of Employment Service, a full-time Placement Service office is maintained to assist enrolled students and alumni of the University in securing permanent employment (including teaching positions) or part-time work. The services of the Placement Service office, located on the second floor of the Administrative Annex, are free. Music students also have available to them the placement services of the Dana School of Music.

Housing

Admission to the University does not obligate the University to secure living accommodations for the student. The University, however, will assist the student in finding a satisfactory place to live. In accordance with the basic principles of the University concerning human rights, no campus or off-campus housing facility that discriminates on the basis of race, color, or creed will be recommended to students.

The University has residence hall facilities for two hundred men. Residence hall accommodations include room and food service on a contract basis for the quarters requested. Further information and applications can be obtained by writing to the Assistant Dean of Student Affairs, Room 115, Kilcawley University Center.

GENERAL INFORMATION

The University provides a list of approved off-campus housing for men and women. The housing has been inspected and has met minimum University standards. The University does not place students in off-campus housing; therefore, personal arrangements must be made for these facilities. Only those facilities which appear on the University's approved housing lists are recommended.

Women students not living at home should obtain approval from the Associate Dean of Student Affairs for their housing arrangements. An approved housing list for men students may be obtained in the office of the Assistant Dean of Student Affairs.

Food Service

Any student not residing in Kilcawley Men's Residence Hall may purchase a meal ticket on a quarterly basis. Arrangements may be made through the Office of the Assistant to the Vice President for Financial Affairs, Jones Hall. The cafeteria in Kilcawley Center also serves meals and light lunches a la carte.

International Students

The international student is a welcome member of the Youngstown State University community. His contribution to the University community is to enrich and to share with others knowledge, understanding, and appreciation of his culture.

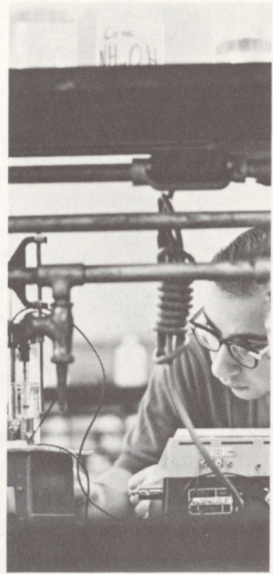
It is expected that an international student will have attained a certain degree of proficiency in the use of English at the time he arrives on the campus, so that he will be able to engage in academic endeavor with benefit to himself. The University affords its international students the same opportunity to be participants in University affairs as all other students. Students from abroad, whether initial or transfer students, are governed by the directives contained in the brochure entitled "Information for Prospective International Students."

The International Student Office provides the foreign student with those special services necessary and unique to his educational pursuit and his stay in the United States. All new students should contact the International Student Advisor, Mrs. Edna McDonald, immediately upon arrival in Youngstown. Citizens of the United States who wish to study abroad also may seek advice from this office.

The International Student Organization is a voluntary organization providing the foreign student with opportunities for contacts with students from other countries, with his own fellow countrymen,

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with American students, and with many faculty members. Presently there are over 30 countries represented on campus. Meetings are held every Friday night.



The Graduate School

DEVELOPMENT AND ORGANIZATION

On March 28, 1967, the Trustees of The Youngstown University authorized the president and faculty of the University to begin the process of developing graduate programs at the master's degree level, such programs to commence in the fall quarter of 1968. In May 1967, the Faculty Senate of The Youngstown University considered and authorized the development of master's degree programs in various academic departments of the University. The Youngstown State University Board of Trustees, at its first meeting on August 15, 1967, established the office of the Dean of the Graduate School and the general regulations governing the appointment of a Graduate Faculty. It also identified and authorized the initial graduate degree programs that were to be offered. These programs were approved by the Ohio Board of Regents on December 15, 1967, and received preliminary accreditation by the Commission on Colleges and Universities of the North Central Association of Colleges and Secondary Schools in July 1968.

The Graduate School is administered by a dean who is also a member of the Graduate Council. The elected members of the Graduate Council consist of one representative of each of the academic units of the University in which graduate programs are offered, and four faculty members-at-large elected by the Graduate Faculty. Standing committees of the Graduate Council are Committees on Curriculum, Policy, Graduate Faculty Membership, and Scholarships, Assistantships, and Awards.

MASTER'S DEGREES

The master's degree programs offered by Youngstown State University are as follows:

Master of Arts (Economics, English, History).

Master of Business Administration (Accounting, Management, Marketing).

Master of Science (Biology, Chemistry, Mathematics).

Master of Music (Applied Music; Woodwind Specialization; Music Education; Theory and Composition; Musicology).

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Master of Science in Engineering (Civil, Electrical, Mechanical, Metallurgical).

Master of Science in Education (Master Teacher Program for Elementary and Secondary School Teachers; Principalship Program, Elementary and Secondary Schools; School Counseling and Guidance; and Special Education for Slow Learning Children).

ADMISSIONS

Students are admitted to the Graduate School by the Dean of the Graduate School on recommendation of the department in which the applicant wishes to do his major work. Acceptance for admission is required before registration in any course for graduate credit.

The complete application for admission, including all supporting materials, must be received by the Graduate School at least four weeks before the beginning of the term in which the applicant plans to register. Youngstown State University will admit graduate students in the fall, winter, spring, and summer quarters, except that foreign students may not enter during the summer quarter.

The attention of foreign students is called to the special requirements governing their application for admission.

It is anticipated that, in the first years during which a graduate program at Youngstown State University is offered, provision will usually be made only for part-time study. The student who wishes to enroll as a full-time graduate student should discuss this possibility with the faculty member in charge of the program in which he wishes to enroll before making application for admission.

Application Procedure

Application for admission must be made on a form provided by the Graduate School, following the procedure outlined below. The materials necessary for making application can be secured by writing to the Dean of the Graduate School, Youngstown State University, Youngstown, Ohio 44503.

1. Complete the application form and return it to the Dean of the Graduate School.

2. An application fee of \$15.00 is charged each student making application to the Graduate School whether or not the student has paid this fee at the undergraduate level. This fee is not refundable. Make the check payable to Youngstown State University, label it "Graduate Application Fee," and include it with the application.

YOUNGSTOWN STATE UNIVERSITY

3. Request the registrar of each college or university you have attended, *except* Youngstown State University, to send *directly* to the Dean of the Graduate School two copies of an official transcript of your work. Personal copies of transcripts will not be accepted. Official transcripts will not be returned. The attention of foreign students is called to the special requirements governing their application for admission.

Applications for admission cannot be reviewed until the official transcripts of all previous college or university work, and the application fee of \$15.00, are received. It is imperative, therefore, that the applicant see that these reach the Graduate School at the earliest possible date. Omission of information called for on the application form will necessitate requests for the additional information and therefore delay processing of the application, so the applicant should take care to provide all the information requested in his first submission of materials.

As soon as possible after receipt of application materials, the Graduate Dean will notify the student of the action taken on his application, and if the student is admitted, will provide him with information on registration procedures.

Admission Requirements

Requirements for admission to the Graduate School are:

1. A bachelor's degree from an accredited college or university.
2. A cumulative grade point average in undergraduate work of 2.5 or above (on a 4.0 scale).
3. Satisfactory preparation for the graduate program in which the student wishes to enroll, as specified by the department of the major. (See below for regulations on foreign student admissions).

The applicant is reminded to check the specific admission requirements of the program in which he wishes to enroll, as these may have requirements in addition to those outlined above.

Students may be admitted with either *regular* or *provisional* status.

Regular status will be granted to students who satisfy the admission requirements for the master's program in which they wish to enroll.

On recommendation of the faculty member in charge of the program involved, and subject to the approval of the Graduate Dean, a student may be accepted with provisional status if his undergraduate

record shows slight deficiencies in comparison with the admission requirements of the program to which he seeks entrance. Students who are admitted on provisional status may be required to make up deficiencies by taking the appropriate undergraduate courses without graduate credit. The academic record of all students on provisional status shall be reviewed when twelve (12) quarter hours of degree credit course work have been completed. The advisor will change the status from provisional to regular if he considers the student's deficiencies have been met and the student's record justifies such a change, and will report the change to the Dean of the Graduate School on the Change of Status form. A continuance of provisional status must be recommended to the Dean of the Graduate School by memorandum reporting the name of the student, cause for provisional status, and justification for the continuance.

Non-Degree Students

Students with a bachelor's degree who desire to register for certain graduate courses, but who do not expect to work toward an advanced degree, may be admitted to the Graduate School as non-degree students on recommendation of the department applied to with the approval of the Dean of the Graduate School. A maximum of twelve credits earned as a non-degree student may later be applied toward a degree if accepted by the department in which the student wishes to earn a degree and approved by the Dean of the Graduate School.

Transient Students

Transient status may be granted to a student who is in a degree program at an accredited graduate school and who submits a graduate transient student form signed by the dean of the graduate school to which he wishes to transfer his credits, showing that he is a graduate student in good standing. The form to be used in such cases may be secured from the Office of the Youngstown State University Graduate School. Under some circumstances transient status may be renewed for a second quarter, but both graduate deans must approve the renewal.

If a graduate transient student later wishes to become a regular graduate student, he must be admitted to a degree program by following the usual admission procedures.

Transfer Credits

Up to nine quarter hours (six semester hours) of graduate work completed at other accredited institutions may be applied toward a

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master's degree at Youngstown State University, provided the student earned at least a *B* grade in such courses. The number of transfer credits to be accepted in each case is to be determined on the basis of evaluation and recommendation by the department of the student's major. It is the responsibility of the student to initiate a request for the approval of transfer credits.

Test Information

In certain master's programs test results must be submitted as part of the admissions procedure. The registration forms for both the Graduate Record Examination and the Admission Test for Graduate Study in Business may be secured from the Counseling and Testing Center, Ford Hall, Youngstown State University; but the applicant must register for the test with The Educational Testing Service, Box 955, Princeton, New Jersey 08540. The student should check with the Youngstown State University Testing Office to learn the deadline dates for registering for these examinations.

Foreign Student Admissions

A graduate of a foreign university must submit with his application, application fee, and reply cards:

1. Official certification (three copies, one of which must be a true copy) of the degree he has earned and the level of scholarship he has achieved;
2. Copies of all course and examination records beyond the secondary school level (three copies of each document, one of which must be a true copy in each case), including grades received, certified as official by the home institution or institutions in which such records were made;
3. Evidence of ability to support himself during the period of his study at Youngstown State University;
4. A physician's certification of his health;
5. The results of the aptitude test and/or the advanced test of the Graduate Record Examination administered by the Educational Testing Service, Princeton, N.J., or some other appropriate examination, as required by certain departments.
6. An interview with and/or an application referral from an Institute of International Education representative where feasible.

After a review of these materials, and the judgment by the Graduate School of Youngstown State University that he is otherwise ac-

ceptable for admission, the foreign student must demonstrate proficiency in the use of the English language by earning satisfactory scores on the Test of English as a Foreign Language (TOEFL) administered in the student's home country by the Educational Testing Service, Princeton, N.J., or on the test administered by the English Language Institute, Ann Arbor, Michigan, or by providing such other evidence as is required by the Youngstown State University Graduate School. The applicant will be informed as to the procedure applying in his case.

Only after providing the required evidence of satisfactory mastery of the English language will the foreign student be granted admission to the Graduate School of Youngstown State University. A foreign student who is accepted will be required to take another test in English after arriving at Youngstown State University to help determine the necessity for remedial work in English and the reduction in the credit hour load of graduate course work resulting therefrom.

While doing graduate work at Youngstown State University, all foreign students must enroll in a plan of group insurance to cover hospital and/or surgical care. A plan is available to students at the University, but other comparable plans may be acceptable.

There is an orientation program held during the first two weeks of the quarter for all international students.

REGISTRATION

Advisement

Before registration, the student should consult with the faculty member in charge of the program to which he has been admitted, or with an advisor to whom he is assigned, for advice in developing a program of study leading to the desired degree.

Registration

Every student registers in person for each quarter by appointment from the Registrar's Office. Registration is concluded on or before the Late and Final Registration date published in the *Schedule of Classes*. Detailed information on registration is contained in the *Schedule of Classes* and in the Directions for Registration received with the registration materials. There is no reduction of tuition or other fees because of late entrance into courses.

No student may enter a course after the seventh calendar day of the quarter or after the fifth calendar day of a summer term. Registration is not officially completed until all tuition and fees are paid.

Change Of Registration

A registered student wishing to alter his schedule must complete a Change of Registration form, have it signed by his advisor, and present it with a properly completed Change of Registration Scan Sheet to the Registrar's Office. Withdrawal from a course must be accomplished through the Change of Registration procedure. Simple failure to attend class or notification to an instructor is insufficient. A grade of F will be recorded unless a student officially withdraws. A Change of Registration is not official until a student has presented the Change to the Bursar's Office.

Cancellation Of Registration

Any student who effects a complete withdrawal from courses prior to the first day of classes is considered to have cancelled his registration. A student is not officially enrolled for a particular quarter if he is not registered on the first day of classes. Students who have a break in their attendance must apply for readmission as a former student.

OTHER REGULATIONS

Time Limit

All work (including transfer credits) offered in fulfillment of the minimum credit hour requirement for the degree must have been taken within the six-year period immediately preceding the date on which the last requirement is completed. When graduate study is interrupted by military service, the six-year limit may be extended.

Graduate students who fail to take courses or otherwise to pursue their graduate education for a period to two years, will be readmitted only under regulations in force at the time of reapplication.

Graduate Courses

Courses in which graduate credit may be earned are of two types.

1. 900- and 1000-level courses, which are open to graduate students only. *At least one half* of the credits applied toward the degree must be earned in courses in the 900- and 1000-series.

2. Upper Division undergraduate courses (700- and 800-series courses) in which the student may enroll for graduate credit only with the approval of his advisor.

Only certain Upper Division undergraduate courses may be taken for graduate credit. Those that are in this category are listed in the *Courses* section of this catalog.

Second Master's Degree

A student who has a master's degree from Youngstown State University and desires a second master's degree must earn a minimum of 18 quarter hours of credit in addition to the total that he had when he completed the requirements for the first degree and must complete the requirements for another graduate program. Students with a master's degree from another university will be limited to a maximum of 9 quarter hours of transfer credit.

Interrupted Enrollment

Students anticipating re-enrollment following a fall, winter or spring quarter of non-enrollment must apply for readmission well in advance of the registration period, to allow time for the administrative work that must precede the generation of registration material for them.

Graduate Credit for Upper Division

Undergraduate Courses

To earn graduate credit in an Upper Division undergraduate course that may be taken for graduate credit, the student must have been admitted to the Graduate School at the time such a course is taken.

Academic Standards

A cumulative quality point average of at least 3.0 (on a 4.0 scale) is required for graduation. This pertains only to courses taken at Youngstown State University that are acceptable for the degree. (See grading system for grades less than C.)

Good academic standing for graduate students is a cumulative grade point average of 3.0 or better (on a 4.0 scale) in courses acceptable for the degree program. (Elective courses, not acceptable for the degree program, are not included in the point average determination.) Graduate students who are not in good standing in any given quarter may continue to take graduate work until required to withdraw from the graduate program in which they are enrolled by recommendation of the department concerned and with approval of the Dean of the Graduate School.

Full-Time Status

A full-time student is one carrying 12 or more credit hours in courses that give credit toward the degree.

Reduced Load for Employed Students

The Graduate School reserves the right to reduce the class load of employed students. Normally the student employed full-time will not be allowed to enroll for more than six quarter hours of graduate course work.

Graduate Courses for Undergraduates

An undergraduate student who has senior standing and a cumulative grade point average of 2.7 or above, and who does not require a full schedule to complete his baccalaureate degree requirements at Youngstown State University, may enroll in 900- and 1000-level courses for graduate credit, provided such enrollment does not cause his total schedule for the quarter to exceed 16 quarter hours. Before registering for the courses the student must have the approval of his advisor, the instructor of each course in which he wishes to enroll, and the Dean of the Graduate School. The credit earned cannot be counted toward fulfillment of the requirements for a bachelor's degree, and may not be used for graduate credit at Youngstown State University until the student is admitted to the Graduate School and the credit is accepted by the department in which the student continues his graduate work. The maximum amount of such credit that will be acceptable at Youngstown State University is 15 hours.

Permission to undergraduates to enroll in graduate courses for undergraduate credit will be granted only to students with proven exceptional academic ability; such permission will be based on a petition prepared by the student's major department containing a statement of criteria used to determine "exceptional" and approved by the department offering the course and the Dean of the Graduate School.

Grading System

The following grading system is used in reporting a final evaluation of the work of graduate students in courses or thesis research: *A*, *B*, *C*, *D*, *F*. The grade point equivalents are 4, 3, 2, 1, and 0 respectively.

Grades of *D* and *F* carry no graduate credit but will be used to determine the student's grade point average. Failure will normally be indicated by a *D*; a grade of *F* means the instructor doubts the student's ability to do work at the graduate level. A student has the privilege of repeating a course once, but the repetition is treated merely as another course, along with the first, in calculating the student's grade

point average. The grade of *F* can also result from failure to withdraw officially from a course (see *Change of Registration*, above).

An incomplete grade of *I* may be given to a student who does satisfactory work in a course but who, for reasons beyond his control and deemed justifiable by the teacher, does not complete all requirements for a course by the time grades are submitted. A written explanation of the reason for the *I* will be forwarded to the Records Office for inclusion in the student's permanent record, with copies to the student, department chairman, and the dean of the school. Until the *I* is converted, it will not be included in the calculation of the student's point average.

The grade of *W* will be given for all withdrawals properly processed during the first six weeks of any quarter (or first three weeks of a summer session). ("Properly processed" describes withdrawals made in conformity with the instructions on the official Change of Registration form.) A withdrawal made after the three- of six-week period will be recorded as an *F* unless the withdrawal was the result of circumstances over which the student had no control as shown by evidence presented by the student in a petition to the Dean of the Graduate School. Any grade of *F* assigned because of absence may be reviewed upon petition to the Graduate Dean. Where withdrawals change the status of a student from full-time to part-time, the student immediately forfeits any privileges contingent upon full-time status, and notice of the change is sent to those legally requiring it (draft boards, scholarship or loan-supporting agencies, etc.).

In the case of thesis work still in progress at the time grades for the quarter are to be reported, a *PR* may be reported in place of a quality grade. This symbol indicates that the student is working in a manner which merits his being allowed to continue, but does not indicate a specific quality of work. In the quarter when the work is completed, the instructor will report an *A*, *B*, *C*, *D*, or *F* that will apply to all the work done in the preceding quarter or quarters as well.

Au signifies that the student was enrolled in the class as an auditor. This mark may be given only to a student who has begun a course as an auditor or who has changed his status to that of auditor before six weeks of a regular quarter or three weeks of a split summer session have elapsed.

Change of Curriculum

A student may transfer from one graduate program to another when an advisor in the program to which he is transferring has been appointed and has accepted the student as an advisee, and when the change has

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been reported to and approved by the Dean of the Graduate School. In such cases of transfer, courses taken in the original curriculum that also apply toward the degree in the new curriculum will be accepted and the credit hours and quality points earned in such courses will be counted in computing the student's grade point average. None of the credit hours or quality points earned in other courses in the original curriculum will be taken into account in the new curriculum.

Auditing Courses

A student may register for and attend any courses as an auditor. An auditor is not held responsible for the regular classwork, class attendance, and preparation of assignments, and receives no credit for the course. He pays the regular fees for the audit course, as well as any other applicable fees. Audit courses are carried in a student's load only for fee purposes and for required overload approval. A student who has registered for a course for audit may not change that status to credit after the last day to add a class.

Foreign Language Proficiency Examinations

The Department of Foreign Languages administers proficiency examinations in the following languages: French, German, Greek, Hebrew, Italian, Latin, Russian, and Spanish. The graduate student should consult his major department to learn specific requirements. These examinations are offered only in foreign languages currently taught at this institution.

The *advanced* proficiency examination tests the student's ability to read scholarly material in his general field through translation. The passage to be translated is chosen by the major department in consultation with the Department of Foreign Languages. The examination will be 60 minutes in duration. A dictionary may be used. The *advanced* proficiency examination will be administered on the first Mondays in December and May only.

The time and place of all proficiency examinations will be announced in advance by the Department of Foreign Languages and the Office of the Dean of the Graduate School.

Students planning to take a proficiency examination must register with the Department of Foreign Languages in Jones Hall, Room 312 no later than two weeks prior to its administration.

A grade of "pass" or "fail" on the proficiency examination will be registered with the Office of the Dean of the Graduate School.

It is not the responsibility of either the University or the Department of Foreign Languages to tutor students for these examinations or to recommend tutors.

Commencement

At the beginning of the quarter prior to the quarter in which he expects to receive his degree, the student must notify his advisor of his intention to apply for graduation on a form provided for this purpose by the Graduate School, a copy of which must be filed with the Office of the Graduate School. Formal application for graduation must be filed before 12 noon on the Saturday ending the first full week of the graduating quarter, on a form provided by the Office of the Graduate School.

There are three graduation ceremonies each year: Winter Commencement, in March, at the end of the second quarter of the academic year; Spring Commencement, in June, at the end of the third quarter; and Summer Commencement, in August or September, at the end of the summer session. A student who completes the requirements for a degree at the end of the Fall quarter receives his degree in March and is present, if at all possible, at the Winter Commencement. If it is not possible for a student to be present at commencement, a request in writing to receive the degree *in absentia* must be made to the Dean of the Graduate School.

COSTS AND FEES

The charges for graduate work depend upon whether the student is a full-time or part-time student, and upon his legal residency.

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STUDENT TUITION AND FEES EFFECTIVE FALL QUARTER, 1971*

FOR FULL-TIME STUDENTS

(12-17 Quarter Hours)

	Per Quarter	Per Year**
IN-STATE.....	\$190.00	\$ 570.00
IN-STATE MUSIC MAJORS (approximate)	265.00	795.00
OUT OF STATE.....	350.00	1,050.00
OUT OF STATE MUSIC MAJORS (approximate)	425.00	1,275.00

BREAKDOWN OF ACTUAL FEES CHARGED

INSTRUCTIONAL FEE.....	150.00
GENERAL FEE.....	40.00
NONRESIDENT TUITION SURCHARGE.....	160.00
APPLIED MUSIC FEE PER QUARTER HOUR.....	25.00
CHARGES FOR EACH QUARTER HOUR ABOVE 17 HOURS:	
INSTRUCTIONAL FEE.....	15.00
NONRESIDENT TUITION SURCHARGE.....	19.00

FOR PART-TIME STUDENTS

(Below 12 Quarter Hours)

INSTRUCTIONAL FEE PER QUARTER HOUR.....	15.00
GENERAL FEE.....	12.00
NONRESIDENT TUITION SURCHARGE PER QUARTER HOUR.....	19.00
APPLIED MUSIC FEE PER QUARTER HOUR.....	25.00

*The University reserves the right to change any fee without notice.

**3 academic quarters

For Audited Courses

A student auditing a course or courses pays the regular fees, plus any other fees that may be applicable.

Participants in non-credit courses offered as part of the University's Continuing Education program will be charged fees as approved for the specific class.

If a student withdraws from an audit course and/or a course in Continuing Education the account will be revised and charges prorated in accordance with the regular University withdrawal and refund policies and their exceptions as stated further on in this section.

Other Fees

Admission Test Fee for Graduate Study in Business (ATGSB). An aptitude test designed to measure abilities important to the study of business at the graduate level. The test is offered twice a year—fall and summer. The examination fee is \$10.00 and registration forms are available at the University Counseling and Testing Center.

Application Fee. A fee of \$15.00 is charged every new student at the time of his application for admission to the University. *This fee is non-refundable.*

Change of Registration Fee. A fee of \$2.00 is charged anyone changing his registration unless a class in which the student is registered is cancelled or divided by the administration and/or student completely withdraws from the University. Appeals will be subject to the supervision of the Finance Committee. (Note: Students with changes in registration necessitating an increase in charges will receive a revised bill showing additional payment to be made within 10 days after the revision. Failure to make the additional payment before the due date on the revision will result in an assessment of an additional \$5.00 late fee.)

Credit by Examination Fee. Fees are charged at the student's regular rate for each hour of credit honored for graduation when such credit is given as the result of examination or equivalency evaluation without the student's having attended the regular classes for the course of instruction. The credit by examination may be granted under special circumstances to students who can demonstrate proficiency in certain subjects. The subjects in which such examinations may be given and the nature of the examinations are to be determined by the departments and divisions concerned and must be approved by the dean of the appropriate school. Registration for credit by examination can be done *only prior to or during the first week of an academic quarter.*

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Food Service Meal Ticket. Students not residing in a University residence hall may purchase a meal ticket for any given quarter at the cost of \$190. This includes three meals a day, Monday through Friday and two meals on Saturday and Sunday, for the entire eleven-week quarter, except holiday periods.

General Fee. This fee is used for the support of offices, personnel and general institutional services performed for the benefit of enrolled students, construction and operation of various student facilities such as the student center, together with artists and lecture programs, student government, intercollegiate athletics, student publications, extra-mural women's activities, and other activities benefiting the student body. Beginning with the first day of classes for each term, there can be no reduction or proration of this fee nor is it refundable.

Graduate Record Examination Fee. Two Graduate Record Examinations, the Aptitude and Advanced tests, are administered on campus five times a year. Advanced tests are given in twenty (20) different fields. Individual departments specify which test must be taken. The fee for the Aptitude is \$8.00; one Advanced test is \$9.00. Registration forms are available at the Counseling and Testing Center.

Graduation Fee. A fee of \$20.00 is charged anyone who is to receive a degree. The fee, which includes cap and gown and diploma, and which helps to defray the general expense attendant to the commencement exercises, must be paid before the official application for graduation is received by the dean of the school in which the student is enrolled. No reduction in this fee may be made for graduation *in absentia* or for approved use of non-academic apparel.

This fee applies for each degree granted (unless honorary), except that if two degrees are to be conferred at the same commencement, the total fee is \$25.00 (\$5.00 plus the regular \$20.00).

All students shall pay one fee for each degree received. Once a student has paid the graduation fee for a specific degree he shall not be recharged a graduation fee for that same degree even if several years lapse before the degree is conferred.

Health and Physical Education Locker and Towel Fees. Users of facilities in the Beeghly Health and Physical Education Building who require clothing change and shower facilities consist of two groups. All users must be enrolled students at YSU, employees of the University, or persons or groups granted permission for use of facilities by the University.

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Each student enrolled in a physical education class requiring locker, basket or towel use will be provided this service upon payment of a non-refundable fee of \$2 for each quarter of such enrollment.

Each other user will be provided towel service and locker or basket service upon payment of a non-refundable fee of \$3 per person for each quarter of such use.

Loss of locker lock shall result in collection of a replacement fee of \$2 from the user. Loss of towel shall result in collection of a replacement fee of \$1 from the user.

Identification Card Replacement Fees. A fee of \$5.00 is charged for replacement of an I.D. card; this cost includes a current term validation sticker. A fee of \$3.00 is charged for replacement of only the current term validation sticker.

Irregular Examination Fee. When a student is given permission to take an examination at a time other than the scheduled one, a fee of \$5.00 is charged at the discretion of the dean, except in the case of illness, when the student must present a letter from his physician.

Late Payment Fee. A fee of \$15.00 will be charged any student who pays his bill after the due date but before the payment cut-off date. Registration is considered complete only at the time of payment. Tuition and fees shall be due and payable in full 10 days prior to the opening of classes or as otherwise shown in the academic calendar of the University.

Late Registration Fee. A fee of \$15.00 will be charged any current student who failed to register during the assigned period and registers late with new and former students.

Proficiency Examination Fee. When a student is given permission to take an examination to demonstrate proficiency in a subject (in a foreign language, for example), he is charged a fee of \$10.00 except when he elects to pay the fee for credit by examination and receive course credit for the work covered by the examination.

Readmission Fee. A fee of \$5.00 is charged to those students who apply for readmission after interrupting their courses of study for periods longer than one quarter in any academic year. This fee is charged each time a student wishes to reapply after remaining out of attendance longer than one quarter in any academic year. This fee is non-refundable.

Registration Withdrawal Fee. A fee of \$5.00 is charged when a student withdraws from all his courses prior to the first day of the quarter,

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or when the terms under Withdrawals and Refunds are waived by the Bursar. A student who registers for a term and does not complete the registration with payment of fees charged, is also charged this fee when he is withdrawn for non-payment 10 days prior to the term.

Special Check-Handling Penalty Fee. A fee of \$5.00 is charged any student who pays the University with a check that is not accepted by the bank against which it is drawn. A returned check intended for payment of registration fees will, in addition to this penalty fee, draw a late registration fee of \$15.00. If the student's account is not paid in full, including these penalty charges, within five days after written notice, the student will be withdrawn from all classes for that term, and the account will be revised and charges prorated in accordance with regular University withdrawal and refund policies.

Student Locker Fee. A fee of \$1.00 is charged for use of any locker on campus (except those in the Beeghly Health and Physical Education Building) for all or part of an academic year. All personal property must be removed by the last day of the summer quarter. Locker assignments are made at the Bursar's Office window, Jones Hall, first floor.

Thesis Binding Fee. A \$5.00 fee is charged for each copy bound by the University Library. The fee is the same for personal copies as well as those required by the University. Payment should be made at the Bursar's Office window, Jones Hall, first floor.

Transcript of Credits Fee. A fee of \$1.00 is charged for each transcript issued by the University. This fee must be paid at the time of the transcript request. Transcripts will not be issued to anyone owing a balance to the University or any of its agents.

Vehicle Registration Permit (Sticker) Fee. A non-refundable fee of \$15.00 is charged each quarter for the purpose of providing access to campus student parking lots, and entrance to such lots is by such sticker affixed to the vehicle in the prescribed manner. A copy of the traffic regulations is issued to all students paying this fee.

Any vehicle not bearing a valid sticker is admitted to an appropriate campus lot on a basis of \$1.00 per entrance, collectible at the gate.

Policy For Withdrawals And Refunds

A student may not enroll for less than a full term. If a student withdraws from a course or from the University, he must fill out an official Change of Registration form and present it to the Bursar's Office. Failure to attend class, or merely notifying the instructor or some other staff member is not an official notice of withdrawal.

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If a student is permitted to withdraw from a course or from the University, the account will be revised and charges made according to the following schedule:

Date of Acceptance by Student Accounts Office*	Quarters	Summer
		Terms 5-1/2 Weeks
1-6 school days**	25%	50%
7-12 school days	50%	100%
13-18 school days	75%	
19th school day	100%	

*Figured from opening date of classes.

**Excludes Sunday, for each specified time period.

If a course is cancelled by the University, fees paid will be refunded in full, or in the event of a full scholarship or grant, proper credit will be made to the specified fund. See additional policies and procedures shown below under Exceptions.

Exceptions

A student who withdraws from the University or from a portion of his schedule for reasons beyond his control, such as illness, military service, job transfer, or shift change imposed by his employer, may have his fees revised in proportion to the number of weeks attended. He must withdraw officially and present evidence to validate his change: for example, a certificate from his physician giving the date he advised the student to withdraw from classes or reduce his academic load, copies of military active duty orders, or a letter from an employer giving the date working hour changes were imposed and a listing of former and current working hours. Charges will be prorated proportionately to the number of weeks enrolled. All requests for this action must be handled by mail. Correspondence should be addressed to the Youngstown State University Finance Committee, in care of the Bursar.

STUDENT RESIDENT STATUS

Residence, for tuition purposes, will be determined at the time of admission or readmission by the Dean of the Graduate School on the basis of the guidelines shown below and information supplied on the "Application for Admission" form.

The resident or nonresident status of a student will generally remain the same throughout his attendance at the University although such status may be reviewed at any time.

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If there should be any doubt on the part of the student regarding the appropriate classification, it should immediately be brought to the attention of the Dean of the Graduate School for a review. Any student who registers improperly with respect to residence, will be required to pay the nonresident tuition surcharge. Retroactive refunds and charges may be made to any student improperly classified.

RESIDENT STATUS APPEALS

Appeal for a change in classification should be made in writing to the Director of Admissions, 101 Jones Hall, who may require the student to complete a form "Application for Nonresident Fee Exemption" available from that office. The Director's written decision will be sent to the student, who may appeal his classification in a personal interview with the Director of Admissions.

He also may request the Director of Admissions to arrange an appearance before the Residence Classification Board. Appearances before the Residence Classification Board generally will be held within two weeks of the request, if possible. The Residence Classification Board is the formal appeal authority in such matters and its decision is final.

GUIDELINES FOR RESIDENCY

The following guidelines will be observed by University officials in making a determination of Ohio residency: (These guidelines have been recommended by the Ohio Board of Regents and adopted by the Youngstown State University Board of Trustees. They are subject to change by the University at any time. Any subsequent changes to these guidelines will supersede those shown in this catalog.)

1. A dependent student shall be considered to be a resident of Ohio if his or her parents or legal guardian have resided in Ohio for 12 consecutive months or more immediately preceding enrollment, or if his or her parents reside in Ohio at the time of enrollment and at least one of the parents is gainfully employed on a full-time basis in Ohio.

2. A student shall be considered to be an Ohio resident regardless of the place of residence of the parents or legal guardian at the time of enrollment if the student resides in Ohio and has resided in the state for 12 consecutive months or more immediately preceding enrollment and if the student presents satisfactory evidence that the parents or legal guardian have not contributed to his or her support during the preceding 12 months and do not claim him or her as a dependent for federal government income tax purposes.

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3. A student shall be considered to be an Ohio resident regardless of the place of residence of the parents or legal guardian at the time of enrollment if the student is gainfully employed on a full-time basis and resides in Ohio, and is pursuing a part-time program of instruction and if there is reason to believe that the student did not enter Ohio primarily for the purpose of enrolling in an Ohio institution of higher education.

4. The residency status of a married student shall be determined without regard to the residency status of the student's spouse.

5. A person in military service or the dependent of a person in military service shall be considered to be a resident of Ohio during the period of time when that person is on active duty status in Ohio and has established a residence in Ohio.

6. A person who enters upon active duty status in the military service as a resident of Ohio and the dependent children of such a person shall be considered to be residents of Ohio if they provide proof of continued domicile in Ohio and of continued eligibility to vote in Ohio.

7. A student classified as a resident of Ohio whose parents or legal guardian move their residence to another state shall be considered to be a resident of Ohio until completion of the degree program in which the student is currently enrolled.

8. A student who at the time of enrollment enters the State of Ohio from another state for the primary purpose of enrolling in an Ohio institution of higher education shall be considered to be a nonresident student, and shall continue to be considered during the period of continuous enrollment as a full-time student in an Ohio institution of higher education.

9. An alien student admitted to the United States on a student visa or other temporary visa shall be considered to be a nonresident student. An alien holding an immigrant visa may establish Ohio residency in the same manner as a citizen of the United States.

10. A student classified as a nonresident student may appeal the classification to an appropriate officer or administrative panel duly constituted by an institution of higher education and may be reclassified as a resident of Ohio if:

- a) the dependent student presents conclusive evidence that his or her parents or legal guardian have established a residence in Ohio and at least one of the parents is gainfully employed on a full-time basis in Ohio;
- b) the student, in addition to demonstrating financial independence from parents, presents clear and convincing evidence of exceptional

circumstances justifying a change in classification because of having established a separate residence in Ohio for 12 months or more preceding the request for reclassification and because of having made definite commitment to enter into gainful employment in Ohio upon completion of a degree program within the ensuing 12 months.

ASSISTANTSHIPS, SCHOLARSHIPS, AND LOANS

Financial assistance is available to graduate students enrolled in specific degree programs in the form of graduate assistantships, scholarships, and student loans. Applications for financial aid must be accompanied or preceded by application for admission. Under no circumstances will financial aid be awarded until the student has been admitted to the Graduate School. Graduate assistantships and scholarships are not available to foreign students in their first year of graduate study at Youngstown State University. Only upon recommendation of the department to the Dean of the Graduate School will exceptions to this rule be considered.

Application for an assistantship or a scholarship should be made to the Office of the Graduate School by March 1st prior to the fall quarter for which the student seeks aid. Late applications will be considered only if additional funds become available. Appointments to assistantships and scholarships are made by the Dean of the Graduate School upon recommendation of the department concerned. Should an award not be made for the specific aid requested, the application will automatically be considered for another form of financial assistance. Notification of the award will be made no later than April 15. After that date, a student who has accepted an award is committed not to accept another appointment without first obtaining formal release for this purpose.

Arrangements for a student loan are made through the Office of the Director of Financial Aids.

Types of Appointments: Two types of appointments are made by the Graduate School: graduate assistantships and scholarships.

Graduate Assistantships: The assistantship program is predicated on the idea that graduate students, when given the opportunity to assist the faculty, not only provide a service to the institution but also gain valuable experience through this work in association with the faculty.

Graduate assistants will be assigned three kinds of duties:

(1) *Instruction.* Youngstown State University is committed to the

maintenance of high standards of instruction in all courses. Master's degree candidates therefore will be assigned to classroom or laboratory duties only under the direct supervision of a full-service faculty member who will retain full responsibility for maintaining high academic and pedagogical standards. Graduate students will be assigned to instructional duties on the basis of teaching experience or other appropriate background.

(2) *Research*. A limited number of assistantships are available which afford students the opportunity to participate in authorized faculty or University research programs. These assistantships are normally not awarded to re-entering students.

(3) *Other academic services*. These are determined by the department of the student's major and approved by the Dean of the Graduate School.

Normally, graduate assistantships are awarded for a period of three quarters beginning with the fall quarter. To remain eligible for the assistantship, a student must discharge his duties satisfactorily and maintain good academic standing. Appointees must maintain enrollment in at least 21 quarter hours of degree credit course work for the regular academic year, and not less than six quarter hours of degree credit course work for any one quarter. ("Degree credit course work" includes whatever courses are stipulated by an advisor to fulfill the requirements of a graduate program.) Approval to carry more than twelve (12) quarter hours or less than six (6) quarter hours in any quarter must be obtained from the department concerned and the Dean of the Graduate School. A graduate student awarded an assistantship may not accept employment at the University, or elsewhere, during the period for which service to the University is required under the appointment.

The stipend for a first-year assistantship is \$3200. In recognition of outstanding performance an increment of up to \$400 may be awarded a student who is appointed for a second year. The appointee is expected to devote approximately twenty (20) hours per week to his assistantship duties. In the event that research duties culminate in a thesis, the time required to compose and prepare the thesis shall be additional.

Scholarships—When available, scholarships in varying amounts for varying periods will be awarded on the basis of the student's academic achievement, his potential for graduate work, and financial need. Both entering and enrolled students carrying at least twelve (12) quarter hours of degree credit work are eligible. To remain eligible for the scholarship,

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a student must maintain good academic standing. The student performs no service for the University.

COURSE NUMBERING SYSTEM, ABBREVIATIONS, AND REFERENCE MARKS

It is important that the student familiarize himself with the University's course-numbering system and its significance, and with the abbreviations used to indicate the amount of credit.

Hyphen. A hyphen between numbers (e.g., 834-835) indicates that credit is not given toward graduation for the work of the first and second quarter until the work of the third quarter is completed, except when special permission is granted by the chairman of the department in which the course is given. *The first quarter of such a course is prerequisite to the second and the second quarter prerequisite to the third.*

Comma. Ordinarily, a comma between numbers (e.g., 841, 842, 843) indicates that the course extends throughout the year, but that credit toward graduation is given for one or two quarters. If one quarter of such a course is prerequisite to another, it is so designated.

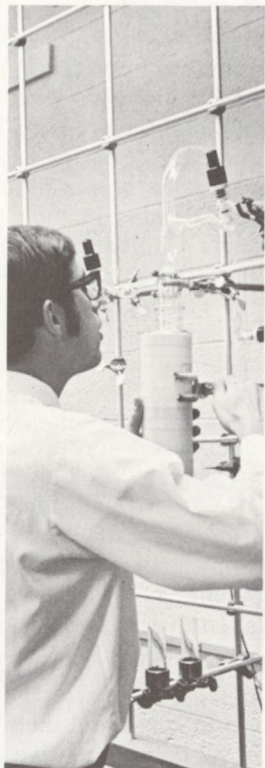
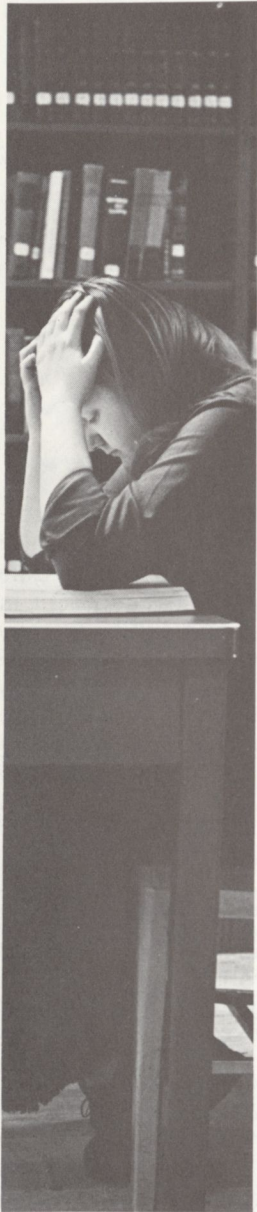
The abbreviation "q.h." at the end of a course description stands for "quarter hours of credit." Thus, credit for a three-quarter course is indicated by the notation 3 + 3 + 3 q.h. meaning "three quarter hours of credit each quarter."

The abbreviation n.c. means "no credit." Thus, 2 n.c. indicates that the course offers no quarter hours of credit but that the course is regarded as two hours for load and billing purposes.

"Prereq." stands for "prerequisite." Though the prerequisite for a course is usually listed in the course description, it may be given in the general information at the beginning of each departmental section.

An asterisk or other reference mark used in a curriculum ordinarily refers to a note immediately following that curriculum. Occasionally, however, such a note may be at the foot of the page.

Graduate Programs



Graduate Programs

In the following pages, the general requirements of the various master's degree programs are described. The admission requirements that are stated are in addition to the requirements for admission to the Graduate School.

MASTER OF ARTS

ECONOMICS

Emily P. Mackall

Chairman of the Department

218 Arts and Sciences Office Building

Admission Requirements

Admission to the program requires the applicant to hold a baccalaureate degree from a recognized college or university, to have achieved a cumulative grade point average of 2.5 or better (on a scale of 4.0), and to have completed 21 quarter hours (or its equivalent in semester hours) in economics, or preparation judged satisfactory by the department. These courses must include principles of economics and one course in statistics. Admission to the program may be obtained prior to submission of scores on the general aptitude and economics advanced test of the Graduate Record Examination but, if so, these examinations must be taken not later than the first date offered following admission.

Degree Requirements

Core course requirements are Microeconomics I and II, Macroeconomics I and II, and Statistical Problems. In addition to the core, the student will choose at least two additional areas of concentration and take at least six quarter hours of course work in each area. At least one of these areas must be Fiscal Economics, International Economics and Development, or Monetary Economics. Graduate credit electives may be taken in the social and applied sciences, and humanities, with the consent of the advisor.

Upon completion of at least 36 quarter hours of graduate work, a comprehensive examination in economic theory must be taken by the student. To be eligible for the comprehensive examination the student

GRADUATE PROGRAMS

must have a scholastic average of not less than 3.0 (B). The comprehensive examination may not be taken more than twice. A student who has successfully passed the comprehensive examination pursues one of the following options for graduation:

- Option (A): The student must complete a minimum of 45 quarter hours of graduate course work.
- Option (B): The student must complete a minimum of 45 quarter hours of graduate course work including a master's thesis. The maximum amount of credit that may be earned for the thesis is nine quarter hours. The thesis must be submitted according to the general requirements established by the Graduate School. The student is required to defend his thesis in an oral examination before a committee of three or more faculty members of the department.

ENGLISH

Ward L. Miner

In Charge of Graduate Studies in English
303 Arts and Sciences Office Building

Admission Requirements

The student should have an undergraduate English major or preparation judged satisfactory by the department.

Degree Requirements

1. All students are expected to complete 45 quarter hours in courses at the 900-level; exceptions must have the approval of the department.

2. Students who enter without undergraduate credit for English 755, 756 (English Linguistics) or its equivalent must make up the deficiency by taking 755, 756 without graduate credit or 980, 981. English 900 is required of all candidates for the M.A. degree in English.

3. Reading knowledge of one foreign language is required. This requirement can be fulfilled by satisfactory completion of the second-year college course (or four years of one language in high school) within seven years prior to admission to the Youngstown State University Graduate School; or by successful achievement on a standardized test approved by the Department of Foreign Languages.

4. Students must submit two satisfactory (*B* or better) graduate

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seminar papers which conform with department standards of form and style and are from two different instructors.

5. A written comprehensive examination will be required for the degree. This examination will be divided into three parts: questions on (a) specific literary works announced at least four weeks prior to the examination, (b) and (c) two areas selected by the student from the following:

- 1) Old and Middle English Language and Literature
- 2) English Renaissance Literature
- 3) Restoration and 18th Century English Literature
- 4) Romantic and Victorian English Literature
- 5) American Literature before the Civil War
- 6) American Literature from the Civil War to World War I
- 7) Recent British and American Literature
- 8) Linguistics

HISTORY

Leslie S. Domonkos

In Charge of Graduate Studies in History
212 Arts and Sciences Office Building

Admission Requirements

The student must have a grade point average in undergraduate study of 2.75 or above (on a 4.0 scale) and a minimum of 24 quarter hours of study in the field of history as an undergraduate (this may be waived upon petition to the Department of History).

Degree Requirements

The total number of credit hours for the Master of Arts degree with a major in history is a minimum of 45 quarter hours. At least 30 quarter hours of the minimum 45 quarter hours, are required in 900-level history courses, including History 949 or 950 (Historiography—American or European). Fifteen quarter hours of course work shall be in a field of concentration, exclusive of the thesis credit. If the candidate is inadequately prepared for the required graduate courses, additional courses must be taken to supplement the undergraduate work (no graduate credit given).

A thesis is required of all candidates for the degree. The Department of History expects that the thesis shall display a capacity for

GRADUATE PROGRAMS

research in a variety of historical sources, the ability to interpret factual information, and shall constitute a properly documented report of the completed research.

Before a student may take his written and oral examinations, his advisor will designate to the Chairman of the Graduate Committee of the Department of History which foreign language, if any, the student is required to know and how this requirement has been met.

Candidates for the Master of Arts in history must pass a written and an oral examination in his major field of concentration. The primary purpose of these examinations are to determine the student's mastery of his major field; the examination will require factual and interpretative material as well as bibliography and historiography.

MASTER OF BUSINESS ADMINISTRATION

The programs leading to the degree Master of Business Administration, and the faculty member in charge of each program, are:

Accounting	Richard M. Magner, Acting Chairman of the Department of Accounting
Management	Dumitru Teodorescu, Chairman of the Department of Management
Marketing	George L. Almond, Chairman of the Department of Marketing

Admission Requirements

Admission is based on the applicant's record of undergraduate studies, work experience, and related information. All applicants with a bachelor's degree, or equivalent, from an accredited university or college, with a cumulative point index of 2.7 or better (on a 4.0 scale) and with no deficiencies in subject matter preparation, will be considered for admission with regular status to the M.B.A. program. Applicants whose grade point index is less than 2.7 but who have demonstrated improved achievement in their junior and senior years, and applicants who have undergraduate deficiencies, will be considered for admission with provisional status to the M.B.A. program. Regular status may be attained by satisfactory completion of at least one-third of the graduate program, the satisfactory completion of any deficiencies, or both.

In addition, all applicants must make a satisfactory score on the

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Admission Test for Graduate Study in Business in order to be admitted with regular or provisional status.

All applicants must have completed satisfactorily work in the following business and economics courses in their undergraduate degree: Accounting (one year); Economics (one year); Marketing (one course); Law (one course); Statistics (one course); Finance (one course); and Management (one course).

In addition to these basic courses that are required of all students pursuing the Master of Business Administration degree, additional prerequisites may be required of the student when he chooses his field of concentration in consultation with his advisor.

Any student deficient in undergraduate prerequisites will be required to take the appropriate undergraduate courses without graduate credit. No student may enroll for graduate credit in any course which he has taken as an undergraduate.

Degree Requirements

The Master of Business Administration degree will require a minimum of 45 graduate credit quarter hours including a thesis (Option A) or a minimum of 51 graduate credit quarter hours without a thesis (Option B). The student may elect either option.

Both options consist of a set of core courses, electives in the field of concentration, and electives outside the field of concentration.

Each candidate for the M.B.A. degree must choose as a field of concentration accounting, management, or marketing. The fields of concentration are to provide the student with in-depth knowledge in the particular area of his special interest and background.

The electives are to be chosen by the student, in consultation with his advisor, to strengthen any areas of weakness before completing his degree requirements. These courses may cover advanced work in a basic discipline or operational field; they may consist of courses offered by the School of Business Administration or may be combined with related disciplines in other schools or departments of the University.

Each candidate for the M.B.A. degree must pass a written comprehensive examination. In addition, an oral examination will be required for those students who choose to write a thesis.

GRADUATE PROGRAMS

MASTER OF MUSIC

Charles H. Aurand, Jr.

Dean

103 Dana School of Music

The following programs of study lead to the degree of Master of Music: Applied Music; Woodwind Specialization; Music Education; Theory and Composition; and Musicology.

Admission Requirements

Applicants for admission to graduate study for the Master of Music degree should present a baccalaureate degree in music from an accredited college or university. Admission will require an undergraduate grade point average of at least 2.5 (based upon a 4.0 scale), and satisfactory aptitude and music scores on the Graduate Record Examination. All applicants for the degree shall take placement examinations in music theory, music history and literature, and pass a piano proficiency examination before or during the first quarter of study. Completion of two years undergraduate study in piano may be accepted in lieu of the piano proficiency examination.

Applicants for the degree Master of Music in the field of applied music must pass an entrance audition performed before the appropriate applied music faculty plus one or more representatives from the Graduate Committee. The audition, in the form of a half-hour recital, should be performed prior to enrolling for graduate study or, if that is impossible, early in the first quarter of graduate study.

Applicants for the degree Master of Music in the field of woodwind specialization must present a baccalaureate degree with a major in music education (instrumental) or applied music (woodwind instrument), show outstanding ability on the major instrument and unmistakable adaptability to other woodwind instruments, and pass an entrance audition on the major instrument and one minor instrument, prior to and during the first quarter of study. Qualified applicants who fail to meet preliminary requirements may be admitted provisionally and shall be eligible to be accepted for the degree program when these requirements have been fulfilled.

Degree Requirements

Candidates for the Master of Music degree must earn 48 credits acceptable for graduate study and must complete all requirements outlined in their respective courses of study, including participation

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in choral or instrumental ensembles and such collateral courses as may be deemed desirable by the Graduate Committee. (See Chart)

Candidates must meet whatever undergraduate foreign language requirements are appropriate to their major area of music study. Applied voice majors are expected to have completed one year each of French, German, and Italian. Musicology majors are expected to have a reading knowledge of at least one foreign language, preferably French or German.

In music education, students may select Plan A (with thesis) or Plan B (without thesis). In applied music, public recital will be presented in lieu of a thesis. In composition, an original composition satisfies the thesis requirement. A thesis will be required of students whose major is theory or musicology.

Academic Standards

To receive the degree Master of Music it will be necessary to achieve a cumulative average of at least a *B* or 3.0 grade point average on a 4.0 basis. The thesis, research, and recital requirements must each meet at least the *B* standard of achievement. Grades received in courses taken for collateral credit or in ensemble courses are not used in determining the academic average of the student. A student who fails to meet the standards set by the School may, on recommendation of the Graduate Committee, be required to withdraw at the end of the quarter.

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REQUIREMENTS FOR COURSES OF STUDY
FOR THE MASTER OF MUSIC DEGREE

	Applied Music	Woodwind Specialization	Music Education Plan A Thesis	B No Thesis	Theory & Composition	Musicology
Applied Music(c)	9	15	6	6	6	6
Major		(9)				
Minor		(6)				
Music Theory	6	6	6	6	9 or 12(a)	6
Music Literature	6	6	6	6	6	12
Recital(b)	6	6	—	—	—	—
Chamber Music	3	—	—	—	—	—
Ensemble	3	3	3	3	3	3
Electives	15(d)	12(g)	6(g)	6(g)	6(e)	15(f)
Conducting	—	—	3	3	—	—
Foundations of Music Education	—	—	3	3	—	—
Administration & Supervision in Music Education	—	—	3	3	—	—
Seminar—Music Education	—	—	3	3	—	—
Thesis	—	—	6	—	6	6
Research Methods & Materials—Music Education	—	—	3	3	—	—
Psychology of Music	—	—	—	3	—	—
Music & the Humanities	—	—	—	3	—	—
Composition	—	—	—	—	9 or 12(a)	—
Total Quarter Hours	48	48	48	48	48	48

- (a) Hours in theory and composition must total 21.
- (b) In lieu of thesis requirement.
- (c) For all degrees except woodwind specialization the requirement in applied music may be met in the student's major and/or minor applied area upon the recommendation of the advisor.
- (d) 9 hours of electives to be selected from pedagogy and literature courses for the principal instrument or voice.
- (e) Theory electives must be selected from the theory area.
- (f) Musicology electives must be selected from the music history and literature area.
- (g) Electives may include cognate fields related to the student's research.

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Applied Music

Graduate students are expected to advance their competence in performance by continued study in their major applied area. (In some cases a minor applied area may be substituted for the major area). Students other than those majoring in applied music are required to undergo a jury examination at the conclusion of the period of study, or at the end of the third quarter of study. Jury examinations and other performance responsibilities for applied majors are established by the appropriate applied music faculty.

Final Certifying Examination

The final certifying examination may not be taken prior to the quarter in which all required course work, including the thesis, if such is required, will be completed. The examination may be written and/or oral. The examining committee shall be composed of members of the music faculty representative of music education (when the major is music education), applied music, theory/composition, and music history and literature. No attempt will be made to have represented on the examining committee only those instructors who taught the classes in which the candidate was enrolled; however, the professor representing his major field will be one of the examiners. The membership of the examining committee will be recommended by the student's academic advisor and approved by the Graduate Committee. The student will be examined on his thesis, his graduate studies, and general music subjects. In case of failure the examination may be repeated once after a suitable interval in which the student will have been expected to strengthen the deficiencies noted. The examination will be rescheduled at the discretion of the Graduate Committee. ~~(The student is expected to be acquainted with the works covered by the bulletin entitled "Recommended Reading for Master's Candidates in Music" issued by the Dana School of Music.)~~ delete!!

MASTER OF SCIENCE

BIOLOGY

Lauren Schroeder

In Charge of Graduate Studies in Biology

415 Ward Beecher Science Hall

Admission Requirements

Admission to the graduate program in biology leading to the Master of Science degree requires a baccalaureate degree from an accredited

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college or university, an undergraduate record showing a cumulative grade point average of at least 2.5 (on a 4.0 scale), and satisfactory completion of at least 25 quarter hours of undergraduate biology (or equivalent) courses plus organic chemistry and introductory physics.

Degree Requirements

The Department of Biology offers a Master of Science degree with two options, thesis and non-thesis. The thesis option requires a minimum of 45 quarter hours of credit; a passing grade on a comprehensive written examination; an oral review of the candidate by the departmental graduate committee; and an acceptable thesis reporting the results of a research project. The non-thesis option requires a minimum of 58 quarter hours of credit; a passing grade on a comprehensive written examination and composition of two library-researched themes. The themes must be in partial fulfillment of the requirements of two topics courses.

The student's course of study will be devised during a consultation with a departmental counselor and will be approved by the departmental graduate faculty. The course of study will be based on the student's area of specialization, background, and career interests.

CHEMISTRY

Leon Rand

Chairman of the Department
324 Ward Beecher Science Hall

Admission Requirements

For admission to the Department of Chemistry for graduate studies leading to the Master of Science degree, the applicant must present an undergraduate major in chemistry or its equivalent. In those cases where undergraduate preparation is slightly deficient, the applicant may be admitted with provisional status with the approval of the Dean of the Graduate School and the Chairman of the Department of Chemistry.

Degree Requirements

A minimum of 45 quarter hours of graduate credit is required for the M.S. degree in chemistry. This includes a minimum of 32 quarter hours of courses excluding Chemistry 990 and Chemistry 998. These 32 quarter hours of courses must include 4 quarter hours of 900-level electives plus three of the following courses: Chemistry 911, 931, 941, and 951. In addition, Chemistry 998 (Seminar) and a minimum of 9 quarter hours of Chemistry 990 (Thesis) are required.

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A thesis advisor should be selected by the time the candidate has completed 18 quarter hours of graduate courses. The thesis advisor will guide the candidate in planning his remaining course program, in carrying out his research, and in preparing his required thesis.

MATHEMATICS

Gus Mavrigian

Acting Chairman of the Department
233 Engineering Science Building

Admission Requirements

To be admitted without undergraduate deficiency, an applicant must have a cumulative grade point average of at least 2.7 in all undergraduate mathematics courses, and an undergraduate mathematics major approximating that required of undergraduate mathematics majors at Youngstown State University. This involves a minimum of 28 quarter hours of courses on the 700- and 800-level including at least a one-quarter course in advanced calculus and a one-quarter course in abstract algebra. Additional course work in these areas is strongly recommended as preparation for the graduate courses.

Degree Requirements

A minimum of 45 quarter hours of credit with a cumulative quality point average of at least 3.0 is required for the M.S. degree. At least 23 of these hours must be taken from 900-level courses. Certain courses from the 700- or 800-level may be included in the student's program if prior approval is given by the student's advisor. Normally, these would be courses not included in the student's undergraduate preparation that would be most helpful in pursuing his graduate program.

Course requirements for the degree are: (1) Math 965 and 966, and (2) an approved 9-hour sequence at the 900-level. The combined undergraduate-graduate program of the candidate must include at least the equivalent of (a) two quarters each of abstract algebra and advanced calculus and (b) one quarter each of complex analysis and topology (Y.S.U. courses 727, 728, 871, 872, 875, 880).

In addition to the course work, the passing of a comprehensive examination is required. This may be written and/or oral, at the discretion of the department.

A thesis for the M.S. degree is optional. A student who elects this option and has the approval of a faculty supervisor will register for Mathematics 999 and will receive credit up to 9 quarter hours upon

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successful completion of the thesis. These hours may be counted as part of the 45 quarter hours required for the degree. The student will be expected to make a successful oral defense of the thesis.

MASTER OF SCIENCE IN EDUCATION

The programs leading to the degree Master of Science in Education, and the faculty member in charge of each program, are:

Master Teacher—Elementary Principalship—Elementary	Marvin W. Chrisp, <i>Chairman of the Department of Elementary Education</i>
Master Teacher—Secondary Principalship—Secondary	Louis E. Hill <i>Chairman of the Department of Secondary Education</i>
School Guidance and Counseling	Lawrence A. DiRusso, <i>Chairman of the Department of Guidance, Counseling, and Pupil Personnel</i>
Special Education (Slow Learning Children)	M. Dean Hoops, <i>Chairman of the Department of Special Education</i>

Admission Requirements

To be admitted to the Master of Science in Education degree program, the applicant must have earned a bachelor's degree from an accredited college or university, and must hold a qualifying teaching certificate (Ohio provisional or otherwise). Admission also requires an undergraduate cumulative grade point average of 2.5 or above and satisfactory preparation for the graduate program in which the student wishes to enroll, as specified by the department of the major. For all students with less than a 3.0 grade average in undergraduate work, a satisfactory score on the Aptitude Test of the Graduate Record Examination or on the Miller Analogy Test is required.

Programs of Study

In general, the programs provide for 1) a core of foundation courses, 2) elective courses in the program being undertaken, and 3) additional work outside the School of Education. A minimum of 48 quarter hours is required for the degree in each program.

A comprehensive examination at the close of the Foundations portion of the work will be required as a basis for becoming a degree candidate.

Foundations of Education

Students in all programs are required to take 12 quarter hours in Foundations of Education:

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Ed. 900	Education in Western Culture	3 q.h.
Ed. 901	Philosophical Foundations of Educational Theory and Practice	3 q.h.
Ed. 902	Sociological Aspects of Contemporary Education	3 q.h.
Ed. 904	Educational Research	3 q.h.

The Master Teacher Program

Option A: Curriculum

1. Six credit hours required of students in both elementary and secondary programs:

Psych. 903	Psychology of Learning	3 q.h.
Ed. 909	The Supervision of Practice Teachers—Elementary, or	3 q.h.
Ed. 910	The Supervision of Practice Teachers—Secondary	3 q.h.

2. Elementary Teachers:

- 1) 12 to 18 quarter hours selected from the following education courses:

Ed. 856	Diagnosis of Reading Disability I	4 q.h.
Ed. 857	Diagnosis of Reading Disability II	4 q.h.
Ed. 917	Elementary School Reading Programs	3 q.h.
Ed. 918	Elementary School Mathematics Programs	3 q.h.
Ed. 919	Social Studies in the Elementary School	3 q.h.
Ed. 920	Elementary School Science Programs	3 q.h.
Ed. 921	Issues, Problems and Developments in Elementary Education	3 q.h.

- 2) 12 to 18 quarter hours of electives from humanities, sciences, and other disciplines.

3. Secondary Teachers:

- 1) 24 quarter hours in courses in appropriate teaching areas
 - 2) Six quarter hours of electives in education or teaching areas
- Students in the Master Teacher Program (Secondary Education) will have, in addition to an education advisor, an advisor appointed from the teaching area to consult on the choice of courses in that area.

Option B: Reading Specialist

1. Courses required of students in both elementary and secondary

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programs:

Ed.	856	Diagnosis of Reading Disability I	4 q.h.
Ed.	857	Diagnosis of Reading Disability II	4 q.h.
Ed.	927	Practicum: Reading	1-6 q.h.
Ed.	930	Supervision of Reading	3 q.h.
Engl.	908	Literature of Children and/or Adolescents	3 q.h.
Psych.	802	Personality	4 q.h.
Psych.	903	Psychology of Learning	3 q.h.
			22-27 q.h.

2. Elementary Teachers:

- | | | | |
|----|---|-------------------------------------|--------|
| 1) | Ed. 917 | Elementary School Reading Programs | 3 q.h. |
| 2) | 6-11 quarter hours of electives. Recommended courses are: | | |
| | Ed. 923 | Review of Reading Research | 4 q.h. |
| | Ed. 929 | Language Arts in the Primary Grades | 3 q.h. |

3. Secondary Teachers:

- | | | | |
|----|---|--|--------|
| 1) | 9-14 quarter hours of electives. Recommended courses are: | | |
| | Ed. 850 | Reading Problems in the Secondary School | 3 q.h. |
| | Ed. 923 | Review of Reading Research | 4 q.h. |

The Principalship Program

1. 27 quarter hours in school administration courses:

- | | | | |
|-----|-----|---|--------|
| Ed. | 946 | The Supervision of Instruction | 3 q.h. |
| Ed. | 947 | Basic Principles of Elementary School Administration, <i>or</i> | 3 q.h. |
| Ed. | 948 | Basic Principles of Secondary School Administration | 3 q.h. |
| Ed. | 949 | School Law | 3 q.h. |
| Ed. | 950 | School Business Management | 3 q.h. |
| Ed. | 951 | The School Principal's Communication Relationships | 3 q.h. |
| Ed. | 916 | The Elementary School Curriculum, <i>or</i> | 3 q.h. |
| Ed. | 931 | The Secondary School Curriculum | 3 q.h. |
| Ed. | 961 | Foundations of Guidance | 3 q.h. |
| Ed. | 953 | Practicum in Administration for School Principals | 3 q.h. |

2. Nine quarter hours of:

- | | | | |
|----|--------------------------------|--|--------|
| 1) | Electives in special education | | 3 q.h. |
| 2) | Interdisciplinary electives | | 6 q.h. |

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Guidance and Counseling Program

Areas of specialization that lead to state certification are: secondary counseling, elementary school counseling and visiting teacher services. Students are required to take 12-18 quarter hours in core courses and the rest in areas of specialization and electives.

All students must have appropriate undergraduate preparation for graduate work in guidance. Normally this would include sufficient course work in psychology, sociology, economics, and biology. Students seeking state certification as guidance counselors or visiting teachers should have teaching certificates. Students without teaching certificates may be admitted if their background and/or present occupation is related to education or the helping professions. Every applicant will be interviewed by the Guidance Programs' Admission Committee. The committee will review the applicant's credentials and make the final decision on admittance to the Guidance and Counseling Program.

Core Course Requirements (12-18 q.h.)

Ed. 961.	Foundations of Guidance	3 q.h.
Ed. 962.	Counseling: Principles, Theory, Practice	3 q.h.
Ed. 964.	Measurement and Evaluation Techniques	3 q.h.
	Psychology electives	3-9 q.h.

Required Courses for Specialization Areas (15-27 q.h.)

Secondary School Guidance

Ed. 963.	Occupational and Educational Information in Guidance	3 q.h.
Ed. 1011.	Counseling Lab Experience	3 q.h.
*Ed. 1009.	Internship for Secondary School Counselors	6-12 q.h.
	Electives in guidance and related disciplines	3-9 q.h.

Elementary School Guidance

Ed. 963.	Occupational and Educational Information in Guidance	3 q.h.
Ed. 1016.	Counseling Lab for Elementary School Counselors	3 q.h.
*Ed. 1008.	Internship for Elementary School Counselors	6-12 q.h.
	Electives in guidance and related disciplines	3-9 q.h.

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*Students not seeking state certification in guidance may substitute 6 quarter hours of Ed. 974 and 6 quarter hours of electives for the internship with permission of advisor.

Visiting Teacher

Ed. 949.	School Law	3 q.h.
Ed. 974.	Case Studies in School Guidance and Field Experience in Community Social Agencies	3-6 q.h.
Ed. 1007.	Practicum for Visiting Teachers	6-9 q.h.
	Electives in guidance and related disciplines	3-9 q.h.

Total course work for the M.S. in Education degree for all areas of specializations total 54 quarter hours.

Program in Special Education

For Slow Learning Children

- 24 quarter hours of special education and related courses:

Psych. 903	The Psychology of Learning	3 q.h.
Psych. 906	Human Growth and Development	3 q.h.
Ed. 976	Problems and Issues in Mental Retardation	3 q.h.
Ed. 977	Research and Problems in the Education of the Mentally Retarded	3 q.h.
Ed. 978	Administration and Supervision of Special Education	3 q.h.
Ed. 979	The Mentally Retarded in Society	3 q.h.
Psych. 980	Psychological Aspects of Mentally Retarded Children	3 q.h.
Psych. (Sp. Ed.) 981	Advanced Seminar in Mental Retardation	3 q.h.

- Twelve quarter hours of electives in the general areas of supervision, administration, diagnosis of reading problems, psychology, and counseling. (For teachers already provisionally certified in elementary or secondary education but not in special education, the qualifying courses for special certification [courses numbered 851 through 855] will tentatively be permitted to satisfy this 12-hour requirement.)

MASTER OF SCIENCE IN ENGINEERING

Programs in civil, electrical, mechanical, and metallurgical engineering lead to the degree Master of Science in Engineering.

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Admission Requirements

In addition to the requirements for admission to the Graduate School, applicants must show a grade point average in undergraduate study of at least 2.75 (on a 4.0 scale) in the courses in the field of specialized study, and meet essentially all of the undergraduate prerequisites for their proposed field of graduate study. Applicants with lesser qualifications may be admitted on the basis of evaluation of their undergraduate record by the engineering department in which they wish to enroll. Applicants may be required to take certain courses, to be determined by their advisors, to make up deficiencies. The student will not be given credit for such courses toward his graduate degree.

Degree Requirements

All engineering departments require at least 45 quarter hours for the master's degree. These hours will be divided in the following manner:

1. Mathematics: 8 quarter hours, usually Mathematics 910, 911: Advanced Engineering Mathematics I and II (4, 4 q.h.)
2. Interdepartmental Courses: 12 quarter hours from:
 - M.E. 982: Engineering Analysis (4 q.h.)
 - M.E. 986. Theory of Continuous Medium (4 q.h.)
 - Met. Engr. 901, 902: Fundamentals of Material Science I and II (4, 4 q.h.)
 - I.E. 901: Optimization Techniques (4 q.h.)
 - I.E. 902: Digital Simulation (4 q.h.)
 - E.E. 951: Network Analysis (4 q.h.)
 - C.E. 910: Advanced Strength of Materials (4 q.h.)
 - C.E. 941: Structural Mechanics (4 q.h.)
3. Departmental Courses: 25 quarter hours

CIVIL ENGINEERING

John N. Cernica

Chairman of the Department

267 Engineering Science Building

This program offers opportunities for advanced studies in two general areas of specialization: fluid mechanics and sanitary engineering; and structural mechanics.

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A minimum of 18 credit hours of departmental courses in the primary area, plus a thesis, is required of all students. The thesis requirement may be waived by the department head upon recommendation of the departmental advisory committee. In that case the student will be required to take at least six hours of course work beyond the 45 required for the degree.

Before the thesis is approved by the advisor and department head, the student must have the approval of the departmental advisory committee via an oral defense of the thesis. In cases where the thesis requirement is waived, the student must, upon completing 40 hours of course work, pass an oral examination related to the course work; the exam will be administered by the department advisory committee.

After completing 12 hours of course work, the student must formulate, with his advisor, his remaining program of study.

ELECTRICAL ENGINEERING

Matthew Siman

In Charge of Graduate Studies in Electrical Engineering
290 Engineering Science Building

The Department of Electrical Engineering provides the opportunity for specialized study in control systems, electronics, and electromagnetic fields.

After the completion of 12 credit hours, the student is assigned a program committee with which he will jointly develop his remaining program of study. The program must include E.E. 951 (Network Analysis).

Ordinarily, the student's program of study will include a nine credit hour thesis requirement. This requirement may be waived by the department head, upon the recommendation of the student's program committee, and replaced with nine credit hours of course work selected by the committee. A student attempting a thesis must orally present and successfully defend his thesis findings. A non-thesis student must pass a written and/or oral comprehensive examination relative to his major field of study.

MECHANICAL ENGINEERING

Frank J. Tarantine

In Charge of Graduate Studies in Mechanical Engineering
205 Engineering Science Building

YOUNGSTOWN STATE UNIVERSITY

Two general areas of specialization are offered: mechanics of rigid and deformable solids; and heat and fluid flow.

After completing 12 credit hours, including Mathematics 910 (Advanced Engineering Mathematics I) and M.E. 982 (Engineering Analysis I), the student will be assigned to a graduate committee of three faculty members who will plan his remaining course work and decide if his program is to include a thesis, a graduate project, neither, or both. A maximum of nine hours of credit towards the degree may be obtained for Thesis and Graduate Projects, of which not more than five hours may be in Graduate Projects. The student will omit other departmental courses if he takes Thesis and/or Graduate Projects for credit. If a thesis is undertaken, the student will be required to defend it in an oral examination. Students may be required to take a comprehensive examination as a degree requirement.

M.E. 982 (Advanced Engineering Analysis) is required of all mechanical engineering students. Math. 910 (Advanced Engineering Mathematics I) and Math. 911 (Advanced Engineering Mathematics II) are also required as part of the M.S. degree in mechanical engineering. A student must also have a minimum of 16 quarter hours in 900-level mechanical engineering courses.

MATERIALS SCIENCE

Tadeusz K. Slaweki

*Chairman of the Department of Chemical Engineering
and Materials Science*

225 Engineering Science Building

For admission to the program in metallurgical engineering the candidate must have a bachelor's degree in engineering or in natural sciences (physics, chemistry, or mathematics). Any candidate holding an undergraduate degree only in natural sciences will be required to take certain courses, to be determined by his advisor, to make up deficiencies. The student will not be given credit for such courses toward his graduate degree except with the permission of the departmental advisory committee.

The minimum quarter hours required for the degree is 46 hours, 21 quarter hours of which are applied towards the general advanced courses in other engineering disciplines. The remaining quarter hours are devoted to the specialized courses in metallurgical engineering and material science. All students are required to take the following courses:

- | | |
|----------------|----------------------------------|
| Met. Engr. 920 | Advanced Physical Metallurgy I |
| Met. Engr. 922 | Advanced Mechanical Metallurgy I |

GRADUATE PROGRAMS

Met. Engr. 960 Research Seminar

Having established his option, the student chooses electives from the courses listed in his chosen option.

OPTION A Metallurgical Engineering

Research

- Met. Engr. 921 Advanced Physical Metallurgy II
- Met. Engr. 923 Mechanical Properties of Materials II
- Met. Engr. 951 Introduction to Electron Microscope and Field Ion Microscope
- Met. Engr. 952 Dislocation and Plastic Flow
- Met. Engr. 953 Thermodynamics of Solids

Industrial

- Met. Engr. 910 Extractive and Process Metallurgy
- Met. Engr. 921 Advanced Physical Metallurgy II
- Met. Engr. 931 Engineering Alloys
- Met. Engr. 932 Industrial Metallurgy
- Met. Engr. 933 Chemical Metallurgy

OPTION B Material Science

Research

All courses listed under *research* option in Met. Engr. *plus* the following courses:

- Met. Engr. 954 Advanced Polymer Science
- Met. Engr. 955 Advanced Refractory Materials
- Met. Engr. 956 Advanced Nuclear Materials

Industrial

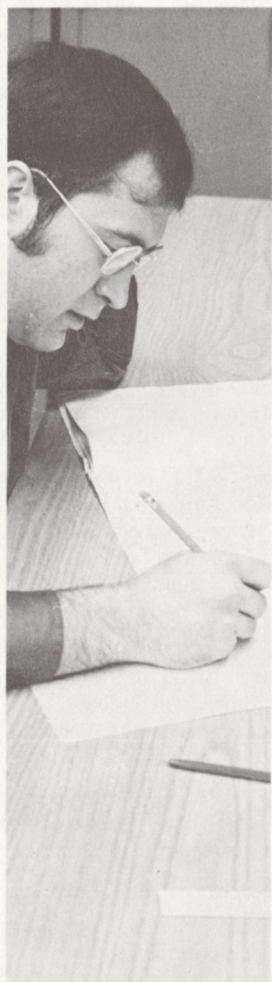
- Met. Engr. 851 Introduction to Polymer Science
- Met. Engr. 852 Advanced Engineering (Non-metallic) Materials I
- Met. Engr. 853 Advanced Engineering (Non-metallic) Materials II
- Met. Engr. 854 Advanced Engineering (Non-metallic) Materials III
- Met. Engr. 954 Advanced Polymer Science
- Met. Engr. 955 Advanced Refractory Material
- Met. Engr. 956 Advanced Nuclear Material

In all options, the student undertakes a program of independent research. This program is jointly arranged by the candidate for the degree, the professor-in-charge, and the departmental advisory com-

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mittee. The thesis requirement may be waived by the department head. In the non-thesis program, the student will be required to take six additional hours of course work beyond the 46 hours required for the program.

The administration of the program will be governed by the regulations of the Graduate School and of the department. The student must secure a copy of the graduate student folder from the department office.



Courses

Included in this section, in addition to the 900-and 1000-series courses that are open to graduate students only, are the Upper Division undergraduate courses (700- and 800-series) that may be taken for graduate credit but only with the approval of the student's advisor. For course descriptions and prerequisites for these courses, see the University Bulletin (Catalog Issue).

ACCOUNTING

Richard M. Magner, *Acting Chairman of the Department*

518 Lincoln Project

- 800. Computer Concepts. (3 q.h.)
- 810. Statement Analysis. (3 q.h.)
- 813. Federal Tax Theory. (4 q.h.)
- 814. Federal Tax Practice. (4 q.h.)
- 820. Funds Accounting. (4 q.h.)

901. *Accounting Theory*. Underlying concepts and procedures, fund flow analysis, problems of multiple proprietary business entities, intercorporate investment and business combinations, estates and trusts and non-profit units. 3 q.h.

903. *Income Determination*. A study of some of the limitations of accounting in the determination of income. Emphasis upon the theoretical aspects rather than upon the methodologies of accounting; various bases of recognition and realization of revenue; matching of costs with revenues; problems caused by the changing purchasing power of the monetary unit; application of index numbers to accounting data. 3 q.h.

905. *Business Tax Planning*. A consideration of the practical utilization of income tax knowledge to minimize business income tax liability. The course will include the following: methods to organize or recognize a business advantageously, steps to gain maximum business deductions, and strategic procedures to make property sales and exchanges. 3 q.h.

915. *Research Techniques*. Nature, methods and techniques of research and the use of research by management; the scientific method in business, sampling theory, variable analysis and research cases. 3 q.h.

921. *Financial Administration*. A study through case analysis of business financing, primarily through the use of long-term funds and from the viewpoint of the chief financial officer. The course is concerned with money and credits, business cycles, and present-value concepts; the formation and

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expansion of capital structures from the standpoints of the owner-manager, the creditors and potential investors, and includes the pricing and marketing of new security issues; new business financing, mergers, reorganizations, and bankruptcies. 3 q.h.

922. *Capital Management*. Managerial economics of capital budgeting, sourcing, rationing and control for large enterprises; forecasting demand and internal generation of capital; estimating costs of capital; measuring productivity of capital; intangible capital investments; administration of capital appropriations; public policy implications. 3 q.h.

996. *Research Problems Other Than Thesis*. Special projects undertaken by M.B.A. students under the direction of faculty members of professorial rank. The exact number to be used will be determined by the nature of the project. Credit will be determined in each case in the light of the nature and extent of the project. 1-6 q.h.

998. *Thesis*. 6 q.h.

ART

Jon M. Naberezny, *Chairman of the Department*

10 Clingan-Waddell Hall

806. Indian Art. (3 q.h.)

807. Chinese/Japanese Art. (3 q.h.)

810, 811. Advanced Ceramics. (3 q.h.)

814. 20th-Century Art to 1925. (3 q.h.)

815. 20th-Century Art from 1925. (3 q.h.)

920. *Seminar in Art Education*. Problems and projects that pertain to the teaching of art at various levels of learning within our schools. The graduate program includes both studio work and pedagogical studies. 920 may be repeated for a maximum credit of 10 hours. Prereq.: Graduate standing and permission of faculty. 5 q.h.

925. *Research in Art Education*. An individual and inventive approach to solving existing problems in art education based upon the philosophy, psychology, principles, practices, and perceptions of past and contemporary trends in art education. 925 may be repeated for a maximum credit of 10 hours. Prereq.: 920 and permission of instructor. 5 q.h.

950. *Studio Problems in Painting*. Individual research of two-dimensional form through various media including oil, acrylic, water color, collage, etc. May be repeated for a maximum credit of 10 hours. Prereq.: Graduate standing. 5 q.h.

951. *Studio Problems in Painting*. Continuation of 950. May be repeated for a maximum credit of 10 hours. Prereq.: 950. 5 q.h.

952. *Studio Problems in Painting*. Continuation of 951. May be repeated for a maximum credit of 10 hours. Prereq.: 951. 2-5 q.h.

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960. *Studio Problems in Sculpture*. Individual research of plastic form through various media including plastics, wood, stone, metals, and related materials. May be repeated for a maximum credit of 10 hours. Prereq.: Graduate standing. 5 q.h.

961. *Studio Problems in Sculpture*. Continuation of 960. May be repeated for a maximum credit of 10 hours. Prereq.: 960. 5 q.h.

962. *Studio Problems in Sculpture*. Continuation of 961. May be repeated for a maximum credit of 10 hours. Prereq.: 961. 2-5 q.h.

BIOLOGY

George W. Kelley, *Chairman of the Department*

409 Ward Beecher Science Hall

802. Ecology. (5 q.h.)

804. Aquatic Biology. (4 q.h.)

804L. Aquatic Biology Laboratory. (2 q.h.)

821. Plant Anatomy. (5 q.h.)

822. Plant Physiology. (5 q.h.)

823. Advanced Genetics. (4 q.h.)

824. Bacterial Physiology. (3 q.h.)

831. Biological Seminar. (2 q.h.)

832. Cytology. (5 q.h.)

834-835. Vertebrate Physiology. (4 + 4 q.h.)

850. Problems in Biology. (4 q.h.)

851. Immunobiology. (5 q.h.)

853. Biometry. (4 q.h.)

863. Growth and Differentiation. (5 q.h.)

872. Protozoology. (4 q.h.)

874. Helminthology. (4 q.h.)

950. *Comparative Animal Physiology I*. Evolutionary development of respiratory, circulatory, nervous, and muscle systems in animal kingdom. Prereq.: Biology 833. 5 q.h.

951. *Comparative Animal Physiology II*. Continuation of Biology 950 to cover osmo-ionic regulation mechanisms, nitrogen excretion, temperature regulation, and endocrine system. Prereq.: Biology 950. 5 q.h.

952. *Experimental Design*. Controlling variables, experimental design, and treatment of data from biological experiments. Prereq.: 853. 5 q.h.

953. *Evolution*. Genetic and ecological forces of evolutionary process. Prereq.: Biology 721. 4 q.h.

954. *Advanced Ecology*. Interrelationships of species within the community and their influence upon the ecosystem. Prereq.: Biology 802.

3 to 5 q.h.

COURSES

955. *Ecosystem Analysis*. Analytical study of structure and change of the ecosystem. Prereq.: College calculus and Biology 802 or 954. 4 q.h.
956. *Physiological Ecology*. Physiological relationships of animals to their ecological roles. Prereq.: Biology 833 and 802. 4 q.h.
957. *Advanced Molecular Biology*. Structure and role of nucleic acids in protein synthesis. Prereq.: Biology 680. 3 q.h.
958. *Marine Biology*. Animals and plants of the sea, their distribution, abundance, ecology, and economic importance. Prereq.: Biology 701. 2 to 6 q.h.
960. *Plant Growth and Development*. Motivating forces of plant development. Prereq.: Biology 680. 4 q.h.
961. *Pathogenic Bacteria*. Biology, epidemiology, and pathology of medically important bacteria. Prereq.: Biology 702. 4 q.h.
962. *Medical Mycology*. Morphology, physiology, and epidemiology of medically important fungi. Prereq.: Biology 702. 4 q.h.
963. *Virology*. Study of plant and animal viruses. Prereq.: Biology 702. 4 q.h.
970. *Experimental Parasitology*. Laboratory demonstration of bionomics of helminth parasites. Prereq.: Biology 701. 5 q.h.
971. *Acarology*. Taxonomy, morphology, bionomics, and economic importance of mites and ticks. Prereq.: Biology 771. 4 q.h.
972. *Systematic Zoology*. Principles, significance, and procedure of zoological taxonomy. Prereq.: Biology 701. 3 q.h.
990. *Master's Thesis Research*. Research selected and supervised by departmental advisor and approved by graduate faculty of Biology Department and Dean of Graduate School. Prereq.: Acceptance by departmental committee. 1 to 10 q.h.
991. *Botany Topics*. Arranged course in botany. Prereq.: Permission of instructor. 2 to 4 q.h.
992. *Invertebrate Zoology Topics*. Arranged courses on subjects of invertebrate zoology. Prereq.: Permission of instructor. 2 to 4 q.h.
993. *Vertebrate Zoology Topics*. Arranged courses on aspects of vertebrate zoology. Prereq.: Permission of instructor. 2 to 4 q.h.
994. *Genetics and Evolution Topics*. Arranged courses in principles of genetics and forces of evolution. Prereq.: Permission of instructor. 2 to 4 q.h.
995. *Parasitology Topics*. Arranged courses in field of parasitology. Prereq.: Permission of instructor. 2 to 4 q.h.
996. *Environmental Biological Topics*. Arranged courses in terrestrial and aquatic ecology. Prereq.: Permission of instructor. 2 to 4 q.h.

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997. *Molecular Biology Topics*. Arranged courses in subjects at molecular level of life. Prereq.: Permission of instructor. 2 to 4 q.h.

BUSINESS EDUCATION AND SECRETARIAL STUDIES

Mae D. Turner, *Chairman of the Department*

200 Rayen Hall

910. *The Improvement of Teaching Shorthand*. Techniques and materials for the teacher of shorthand, transcription, and business English. Research is emphasized. Prereq.: BE & SS 601 and BE & SS 702 or equivalent.

2 q.h.

920. *The Improvement of Teaching Typewriting*. Techniques and materials for the teacher of typewriting. Research is emphasized. Prereq.: BE & SS 601 or equivalent.

2 q.h.

930. *The Improvement of Teaching Basic Business*. Techniques and materials for the teacher of the basic business subjects, including general business, business law, and consumer economics. Research is emphasized. Prereq.: BE & SS 707, Econ. 602, and Management 511 or equivalent.

2 q.h.

940. *The Improvement of Teaching Bookkeeping and Accounting*. Techniques and materials for the teacher of bookkeeping and accounting. Research is emphasized. Prereq.: BE & SS 606 or equivalent.

2 q.h.

950. *The Improvement of Teaching Office Practice and Office Machines*. Techniques and materials for the teacher of office practice and office machines. Research is emphasized. Prereq.: BE & SS 717 and BE & SS 803 or equivalent.

2 q.h.

CHEMISTRY

Leon Rand, *Chairman of the Department*

324 Ward Beecher Science Hall

719, 720, 721. Organic Chemistry. (4 + 4 + 4 q.h.)

722. Organic Chemistry. (2 q.h.)

729. Inorganic Chemistry I. (3 q.h.)

739, 740, 741. Physical Chemistry. (4 + 4 + 4 q.h.)

Note: The above 700-level courses may not be counted toward an M.S. in chemistry, but may be taken for graduate credit by students in other departments.

803, 804. Chemical Instrumentation. (4 + 3 q.h.)

805. Applied Spectroscopy. (3 q.h.)

813. Thermodynamics. (4 q.h.)

821. Intermediate Organic Chemistry. (3 q.h.)

822. Organic Analysis. (3 q.h.)

823. Organic Synthesis. (3 q.h.)

COURSES

829, 830. Inorganic Chemistry II, III (2 + 2 q.h.)

831. Inorganic Chemistry Laboratory. (2 q.h.)

836. Chemical Bonding and Structure. (3 q.h.)

841, 842, 843. Principles of Biochemistry. (3 + 3 + 3 q.h.)

845, 846. Biochemical Techniques. (2 + 2 q.h.)

911. *Advanced Analytical Chemistry*. The theoretical foundations of analysis with emphasis on recent analytical developments and the current literature. Prereq.: Chemistry 741. 3 q.h.

931, 932. *Advanced Inorganic Chemistry I, II*. I) Current theories and types of bonding. Modern interpretations of the descriptive chemistry of the more representative elements and their compounds. II) Modern interpretations of the descriptive chemistry of transition and inner-transition elements and their compounds. Introduction to coordination chemistry. Prereq.: Chemistry 829 or 830. 3 + 3 q.h.

935, 936. *Nuclear Chemistry I, II*. The principles and experimental procedures used in the study of nuclear transformations, natural and artificial disintegration. Prereq.: Chemistry 741. 3 + 2 q.h.

941, 942. *Advanced Organic Chemistry I, II*. Reaction mechanisms and physical organic chemistry. Prereq.: Chemistry 722 and 741. 3 + 3 q.h.

945, 946. *Polymer Chemistry I, II*. A study of the polymerization process and the relationship between structure and the properties of polymers. Prereq.: Chemistry 721 and 741. 945 prereq. to 946. 3 + 3 q.h.

951, 952. *Advanced Physical Chemistry I, II*. Essentials of quantum mechanics and applications of quantum mechanics to molecular structure, spectroscopy, and diffraction phenomena. Prereq.: Chemistry 741. 3 + 3 q.h.

955. *Statistical Mechanics*. Principles and methods of statistical mechanics, classical and quantum statistics with applications to gases, liquid, and solids. Prereq.: Chemistry 951. 4 q.h.

969. *Laboratory Problems*. Organized for high school teachers. A laboratory course which stresses individual effort in solving chemical problems. May be repeated up to 6 q.h. Prereq.: Work in chemistry involving laboratory. 3 q.h.

990. *Thesis*. Hours arranged.

991, 992, 993, 994, 995. *Special Topics*. Topics selected by the staff from fields of current research interest or fields of special emphasis. 991 Analytical; 992 Biochemistry; 993 Inorganic; 994 Organic; 995 Physical. Each may be repeated for credit. 2 or 3 q.h. as scheduled

998. *Seminar*. 1 q.h.

CIVIL ENGINEERING

John N. Cernica, *Chairman of the Department*

YOUNGSTOWN STATE UNIVERSITY

267 Engineering Science Building

910. *Advanced Strength of Materials.* The basic methods of structural mechanics, such as conditions of equilibrium and compatibility, stress-strain relations. General treatment of energy principles including virtual work, minimum potential energy; applications to statically determinate and indeterminate systems such as rings, curved beams, plates, and other elastic systems. 4 q.h.

917. *Open Channel Hydraulics.* Analysis and design of open channels for uniform and nonuniform flow; hydraulic jump analysis; boundary layer and roughness effects; flow over spillways; flow in channels of nonlinear alignment and nonprismatic section. 4 q.h.

941. *Structural Mechanics.* Study of beams under lateral load; beams with combined lateral load and thrust; buckling beams on elastic foundations; applications of Fourier series and virtual work principles to beam-type structures; stress and strain in three dimensions; applications to flexure of beams and plates and to constrained torsion; elements of engineering theory of plates. 4 q.h.

943. *Rigid Frame Analysis.* Basic procedures in analysis of rigid frames having members of constant or variable moment of inertia; method of angle changes, Castigliano's theorems, Maxwell-Mohr method, reciprocal deflections and influence lines, slope deflection, movement distribution, elastic center and column analogy. 4 q.h.

945. *Civil Engineering Analysis.* Applications of mathematical and numerical methods to the systematic analysis and development of problems in the field of civil engineering, including equilibrium, propagation problems in lumped-parameter and continuous systems. 4 q.h.

946. *Matrix Analysis of Structures.* Introduction to matrix algebra; use of matrix methods in the analysis of statically and kinematically indeterminate structures; flexibility and stiffness methods. 4 q.h.

951. *Dynamics of Soils.* The influence of time-dependent loads on the significant physical properties of cohesive and cohesionless soils. Methods of analysis and design for foundations and soil structures subjected to vibratory, blast, and shock loads. 4 q.h.

952. *Advanced Foundation Engineering.* Principles of mechanics of materials applied to foundation problems; stresses and deformations in soils, consolidation theory; shallow and deep foundations. 4 q.h.

953. *Flow Through Porous Media.* Analysis of seepage volume and stresses due to flow of water through soils in connection with dams, slopes, excavations, subsurface drainage and wells. 4 q.h.

956. *Plates and Shells.* Fundamental assumptions and basic equations of the classical theory of plates and shells. Validity and limitations of the theory. Applications to specific problems of plate and shell structures. Prereq.: Graduate standing or consent of instructor. 4 q.h.

COURSES

957. *Structural Stability*. A study of the elastic stability of engineering structures, beam columns, static bucking of elastic beams, frames, plates, and shells, dynamic stability of beams and plates. 4 q.h.
958. *Structural Dynamics*. Analysis of the response of structures to air blasts and earthquake motions; development of both the normal mode and frequency response methods in dealing with periodic and non-periodic excitations. Prereq.: Graduate standing or consent of instructor. 4 q.h.
959. *Advanced Metal Design*. Advanced topics in the structural design of girders, frames and trusses. Light gage metal structures. Use of modern alloys and hybrid systems. 4 q.h.
961. *Advanced Concrete Design*. Consideration of advanced design techniques for reinforced concrete members and structures such as composite and prestressed concrete beams and box girders, lift slabs, folded plates and shells. 4 q.h.
965. *Seminar in Civil Engineering*. The application of special topics in theoretical mechanics to problems in civil engineering. Subjects covered include elasticity, viscoelasticity, plasticity, and wave motion. 4 q.h.
967. *Theory and Design of Sewage Systems and Sewage Treatment Plants*. Theory of the various procedures and techniques utilized in the treatment of sewage. Design of sewage treatment facilities. 4 q.h.
969. *Sanitary Engineering Laboratory*. Theory and methods for chemical analysis of water, sewage, and industrial wastes. 4 q.h.
973. *Intermediate Fluid Mechanics*. Fluid properties. Basic laws for a control volume. Kinematics of fluid flow. Dynamics of frictionless incompressible flow. Basic hydrodynamics. Equations of motion for viscous flow, viscous flow applications, boundary layer theory. Unsteady flow. 4 q.h.
975. *Theory and Design of Water Distribution and Water Treatment Plants*. Theory of the various procedures and techniques utilized in the treatment of water for municipal and industrial use. Review of water quality criteria. Design of water purification facilities. 4 q.h.
- 990, 991, 992. *Thesis*. 3 + 3 + 3 q.h.

CRIMINAL JUSTICE

Jack D. Foster, *Chairman of the Department*

134 Engineering Science Building

800. Readings in Corrections. (4 q.h.)
810. Readings in Crime and Delinquency. (4 q.h.)
815. Police Management Concepts. (4 q.h.)
820. Prevention and Control of Deviant Behavior. (4 q.h.)
825. Constitutional Issues in Criminal Law. (4 q.h.)
955. *Independent Study*. Study under the personal supervision of a

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faculty member with the approval of the department chairman. General topic areas permissible are:

- a. Law Enforcement Practices and Programs
- b. Correction Practices and Programs
- c. Research Methodology in Criminal Justice
- d. Theory in Criminal Justice

This course is repeatable once in a different topic area.

4 q.h.

ECONOMICS

Emily P. Mackall, *Chairman of the Department*

218 Arts and Sciences Office Building

701. Money and Banking. (4 q.h.)

702. Public Finance. (4 q.h.)

787. Population Movements. (4 q.h.)

802. Comparative Economic Systems. (4 q.h.)

803. Business and Government. (4 q.h.)

804. The Economics of Central Planning. 4 q.h.

805. Business Cycles and Economic Growth. (4 q.h.)

806. History of Economic Thought I. (3 q.h.)

807. History of Economic Thought II. (3 q.h.)

808. History of Economic Thought III. (3 q.h.)

810. Managerial Economics. (4 q.h.)

811, 812, 813. Theory of International Trade and Development, I, II,

III. (3 + 3 + 3 q.h.)

820. Regional Economic Analysis. (4 q.h.)

821. Location Theory. (4 q.h.)

831. Labor Markets. (4 q.h.)

833. Collective Bargaining and Arbitration. (4 q.h.)

835. Labor Legislation. (4 q.h.)

900. *Statistical Problems*. Selected topics concerning inference and regression. Analysis of variance, chi-square, F-test, and multiple and partial correlation. 3 q.h.

905. *Quantitative Methods for Economics*. A continuation of the analysis of calculus of one and several variables, difference and differential equations, vectors and matrices and linear programming as applicable to the static and dynamic models in micro and macro economic theory. Prereq.: Econ. 709 or equivalent. 3 q.h.

906. *Econometrics*. Analysis of linear regression model of two variables including problems of estimation, hypothesis testing and forecasting. Extension of the linear model to three and in general to "n" variables. Prereq.: Econ. 900 or equivalent. 3 q.h.

910, 911. *Microeconomic Theory I and II*. Theory of consumer behavior; theory of the firm; the determination of product and factor prices

COURSES

under varying market structures; capital theory and welfare economics; study of static and dynamic conditions of multi-market stability. 3 + 3 q.h.

912. *Welfare Economics*. A study of the foundation of economic policy; historical development of welfare theory and its application to problems of economic policy and planning; evaluation of competitive equilibrium, status of individual and community utility judgment and judgments on the distribution of income; analysis of implications for public policies. Prereq.: Econ. 910. 3 q.h.

919. *Seminar in Microeconomic Theory*. Selected readings in microeconomic theory. Prereq.: Econ. 911. 3 q.h.

920, 921. *Macroeconomic Theory I and II*. The study of the behavior of aggregated economic variables, the purpose being to determine the proper policy mix needed to obtain the economic goals of full employment, stable price levels, etc. Analysis is through rigorous investigation of models describing the neoclassical, Keynesian, and neo-Keynesian schools of thought. 3 + 3 q.h.

922. *Growth Economics*. The macro-structure and operation of the aggregate system with special attention to problems associated with capital accumulation, balanced growth and low level equilibrium. Prereq.: Econ. 920. 3 q.h.

929. *Seminar in Macroeconomic Theory*. Selected readings in macroeconomic theory. Prereq.: Econ. 921. 3 q.h.

930, 931, 932. *Economics for Teachers*. An examination of the major economic issues and problems of our society and the use of applicable economic theory for their solution. Meetings with representatives of various institutions of our society are included in order to relate the issues and theory to present day society. (Intended for elementary education students.) Prereq.: 930 for 931; 931 for 932. 3 + 3 + 3 q.h.

940. *Monetary Theory I*. A theoretical investigation of the static relationships of the quantity of money, level of interest rates, security prices, commercial bank policy and their effects upon the levels of national income, prices, employment and rate of economic growth. Included is an examination of available policy tools and their effectiveness. 3 q.h.

941. *Monetary Theory II*. Analysis of the dynamics and impact of monetary policy with special references to current issues and problems in monetary theory and monetary research. Prereq.: Econ. 940. 3 q.h.

945. *Theory of Federal Finance*. A theoretical analysis of the effects of various policies upon the allocation of resources, distribution of income, level of employment, and rate of economic growth. Investigation of theories of taxation and public expenditure criteria. 3 q.h.

946. *Theory of State and Local Finance*. A theoretical and empirical investigation of state and local taxation and expenditure criteria, tax bases and incidence, problems of finance unique to local governmental units. 3 q.h.

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950. *Theory of the Labor Market.* Intensive study of topics related to the problems and general performance of the various segments of the labor market in a free industrial society within a theoretical framework. 3 q.h.

951. *Issues in Collective Bargaining and Arbitration.* Intensive study and theoretical analysis of topics related to contemporary issues in collective bargaining. 3 q.h.

955. *Industrial Structure.* Comparison of the economic characteristics of industries: growth, technology, concentration, scale economies, geographic concentration, competition, and market structure. Theoretical and empirical comparisons. 3 q.h.

965. *Seminar in Regional Growth.* Readings in the theory and strategy of regional development. Major emphasis is placed upon the theories of regional growth and empirical tests of these concepts. Problems in the use of inter-industry regional models are explored, the importance of human resources investment to regional progress is discussed, and the nature of, causes of, and possible remedies for, slow growth regions are examined. Prereq.: Econ. 821 or consent of instructor. 3 q.h.

969. *Seminar in Urban Economics.* Selected readings in the economic problems of urban areas. Among the topics discussed are: intraurban population migration, problems in the finance and provision of public goods in metropolitan areas, determinants of the demand for and supply of transportation facilities, central place theory, the urban housing market. Prereq.: Econ. 821 or consent of instructor. 3 q.h.

979. *Seminar in Development of Economic Ideas.* In-depth study of the development of economic ideas leading to doctrines reflected in modern economic theory, with particular emphasis on bibliography. 3 q.h.

981. *International Capital Flow.* Advanced study and analysis of long-term and short-term capital accounts in the balance of payments and their domestic and international implications, history and development of private and public international capital markets; the role of foreign aid as a substitute for the diminishing private capital markets; analysis of sources, causes and effects of capital flows both in matured economies and in developing economies. Prereq.: Econ. 920. 3 q.h.

985. *International Economics.* Advanced and comparative studies of international monetary trade theories. Study and analysis of basic factors influencing policies and trend in international assistance. The influence of international economics on national economy and relevant monetary and fiscal policies for economic stabilization. Balance of payment issues and policies. Exchange rates and policies. Prereq.: Econ. 910, 920. 3 q.h.

999. *Master's Thesis.* (3 + 3 + 3 q.h.)

ELECTRICAL ENGINEERING

Raymond E. Kramer, *Chairman of the Department*

289 Engineering Science Building

- 805R. Quantum Electronics. (4 q.h.)
 807R. Pulse, Digital, and Switching Circuits. (4 q.h.)
 808R. Electronic Circuits, Signals, and Systems. (4 q.h.)
 812R. Molecular Engineering. (4 q.h.)
 813R. Logic Circuit Theory. (4 q.h.)
 815R. Energy, Radiation, and Propagation. (4 q.h.)
 817. Control Analysis II. (4 q.h.)
 819R. Plasma Dynamics. (4 q.h.)
 820. Modern Control Theory. (4 q.h.)
 850. Communication Systems II. (4 q.h.)

901. *Control Systems I.* Analysis of linear systems, characteristics of linear systems, analogous systems, development and application of Laplace and other transform methods. Systems with feedback, systems with distributed parameters. 4 q.h.

902. *Control Systems II.* Linear feedback systems theory. Stability criterion. Synthesis in complex and time domain. Multivariable systems (multiple input-output) and multiple loop systems with emphasis on state variable and matrix techniques. Analysis and design of carrier systems. 4 q.h.

903. *Nonlinear Control Systems Analysis.* Introduction to basic nonlinear phenomena and methods. Stability concepts for feedback loops. Study of time-varying nonlinear feedback systems including free and forced responses. Circle criterion, Papov's criterion, O'Shea criterion, and other frequency domain stability criteria. Lyapunov stability theory. O'Shea's response bound theorems. 4 q.h.

911, 912. *Electromagnetic Fields I and II.* Solution of boundary value problems in general form. Laplace, Poisson, and diffusion and wave equations in orthogonal coordinate systems. 4 + 4 q.h.

921. *Quantum Electronic Devices I.* Electronic energy levels in quantum electron devices; application of energy transitions to semi-conductors, masers, and lasers. Analysis of energy of atomic gasses as applied to gas lasers. Crystal structure of solid-state maser and laser materials. 4 q.h.

925. *Physical Properties of Crystals.* The symmetry of crystals and its effect on physical properties, tensor analysis, dielectric and magnetic susceptibilities, elastic and piezoelectric properties, thermodynamics of crystals, transport properties, crystal optics, electromagnetic wave propagation in anisotropic media. 4 q.h.

931. *Digital Systems Engineering I.* Boolean algebra, logical mapping; combination and sequential synthesis; analog and digital conversion; coding structures; hybrid numerical circuitry. Structures of combinatorial and sequential circuit synthesis; logical circuit methods of Quine, Huffman, Mealy, Moore; Boolean Matrices; Bilateral and Cascade networks. 4 q.h.

941. *Linear Electronic Circuits I.* Design of linear active circuits;

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amplifier analysis and synthesis; feedback amplifiers; stability; integrated circuits; transfer functions; synthesis methods; noise determination and reduction. 4 q.h.

951. *Network Analysis*. The analysis of time and frequency domain response of networks using transform and state variable techniques. Matrix methods, modeling, topological properties, and signal-flow analysis techniques. 4 q.h.

954. *Network Synthesis*. A study of realization procedures for driving point and transfer function synthesis of networks. Concepts of positive real functions, methods such as Foster, Caver, Brune, and Darlington. Approximation methods of Butterworth, Tchebyscheff. 4 q.h.

960. *Electrical Engineering Seminar*. 4 q.h.

990. *Thesis*. 1-9 q.h.

ELEMENTARY EDUCATION

Marvin W. Chrisp, *Chairman of the Department*

215F School of Education

856, 857. *Diagnosis and Treatment of Reading Disability I, II*. (4+4 q.h.)

881. *Corrective Techniques in Reading*. (4 q.h.)

882. *Developmental and Content Area Reading*. (3 q.h.)

890. *Elementary Education Workshop*. (3 q.h.)

909. *Supervision of Practice Teachers—Elementary*. Basic counseling and supervisory techniques associated with the acceptance of responsibility for inducting the teaching neophyte into his first truly professional experiences. Actual work with student teachers. 3 q.h.

916. *The Elementary School Curriculum*. Developing an understanding of the meaning of curriculum at the elementary level, evidence of need for curricular changes, influences of society on curriculums, exploration of current status and trends; the role of teacher and administrator in curriculum appraisal and development. 3 q.h.

917. *Elementary School Reading Programs*. A critical appraisal and discussion of current research and traditional programs in the elementary school; goals, content, and problems faced by elementary administrators and teachers in the reading field. 3 q.h.

918. *Elementary School Mathematics Programs*. An analysis of past and present programs of elementary school mathematics; evaluation of programs including a consideration of adequacy of content, recognition of mathematics as a system, provision of number experiences for the learner. 3 q.h.

919. *Social Studies Programs in the Elementary School*. Objectives of elementary school social studies programs in terms of current needs; adaptation of materials of instruction in terms of the social science skills; evalua-

COURSES

tion of student progress; critical analysis of methods of improving instruction in social studies. 3 q.h.

920. *Elementary School Science Programs.* Focus on the objectives for science education in the elementary school; the elementary school science curriculum; process and inquiry in the elementary school science curriculum; process and inquiry in the elementary school science program; teacher education, educational media, and the evaluation of science teaching. 3 q.h.

921. *Issues, Problems, and Developments in Elementary Education.* A study of recent trends in elementary school organization and instruction (nongraded units, team teaching, middle schools, etc.). 3 q.h.

923. *Review of Reading Research.* Appraisal of research methods and design in the area of reading. The aim of this course is to determine how research has been effective in influencing change in reading instructors. Prereq.: Ed. 904 and Ed. 710. 4 q.h.

927. *Practicum: Reading.* Supervised experience in reading correction in the area schools, clinics, and agencies. Prereq.: Ed. 857 or consent of instructor. 1-6 q.h.

929. *Language Arts in the Primary Grades.* An evaluation of the philosophy, principles, and practices of the language arts program in the primary grades. A special emphasis shall be placed in teaching language arts to disadvantaged children. Prereq.: Consent of instructor. 3 q.h.

930. *Supervision of Reading.* This course deals with the role of the supervisor of reading programs including the initiation and supervision of reading programs in the elementary and secondary schools. Emphasis will be placed on selection of reading teachers; selection of reading materials; and the different types of programs that can be developed. Prereq.: Consent of instructor. 3 q.h.

946. *The Supervision of Instruction.* (Sec. Ed. 946) Deals with the supervision of instruction and organization of a school designed for those aspiring to be principals or supervisors. Decision-making, supervision, observation of supervisory experiences, direction in educational technology, the various subjects, staff relationships, school organization, pupil personnel, and extracurricular activities are among the areas considered, with emphasis upon elementary or secondary situations as appropriate. 3 q.h.

947. *Basic Principles of Elementary School Administration.* Investigation and study of the general problems of administration in the elementary school. 3 q.h.

See also under Secondary Education, courses 949, 950, 951, 952, 953, 954, 955, 956.

ENGLISH

Margaret I. Pfau, *Chairman of the Department*

YOUNGSTOWN STATE UNIVERSITY

306 Arts and Sciences Office Building

900. *Introduction to Literary Study and Research.* Basic concepts in literary criticism, analysis, and research. Required of all candidates for the M.A. 3 q.h.
902. *Studies in Literary Criticism and Literary Forms.* (May be repeated once.) 3 q.h.
905. *Studies in the Teaching of English.* Analysis of research and underlying assumptions in the teaching of language, composition, and literature with implications for the teacher of English in the secondary school and introductory college levels. Prereq.: Teaching experience in English. 3 q.h.
908. *Literature for Children and/or Adolescents.* An analytic study of methods for evaluating and presenting literature to children, along with a thorough examination of selected books, both classic and modern, which can be appreciated by children. (Not applicable to M.A. in English) Prereq.: Graduate standing. 3 q.h.
910. *Old English Language and Literature.* 4 q.h.
912. *Studies in Medieval Literature.* (May be repeated once.) 4 q.h.
920. *Studies in Shakespeare.* (May be repeated once.) 3 q.h.
922. *Studies in English Renaissance Literature.* (May be repeated once.) 3 q.h.
932. *Studies in Restoration and 18th-Century Literature.* (May be repeated once.) 3 q.h.
942. *Studies in Romantic and Victorian Literature.* (May be repeated once.) 3 q.h.
952. *Studies in American Literature before the Civil War.* (May be repeated once.) 3 q.h.
962. *Studies in American Literature from the Civil War to World War I.* (May be repeated once.) 3 q.h.
972. *Studies in Recent British and American Literature.* (May be repeated once.) 3 q.h.
980. *Modern English Structure.* An examination of contemporary English structure and of linguistic approaches to its study and analysis. (Only for students without credit in English 755 or its equivalent.) 3 q.h.
981. *History of the English Language.* An examination of the evolution of English linguistic structures from their origins to the present. (Only for students without credit in English 756 or its equivalent.) 3 q.h.
982. *Studies in Linguistics.* (Prereq.: 755, 756, or 980, 981 or equivalent or consent of instructor.) 3 q.h.
- Seminars: (Topics in seminars will vary and will be announced each time the seminar is offered. Each seminar may be repeated twice.)

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1001. *English Literature to 1660.* 4 q.h.
1002. *English Literature since 1660.* 4 q.h.
1003. *American Literature.* 4 q.h.
1004. *Linguistics.* (Prereq.: 755, 756 or 980, 981 or equivalent or consent of instructor.) 4 q.h.

FOREIGN LANGUAGES

Robert E. Ward, *Chairman of the Department*

312 Jones Hall

German

820. Goethe's *Faust.* (5 q.h.)
866. History of the German Language. (3 q.h.)

French

862. History of the French Language. (3 q.h.)

Spanish

864. History of the Spanish Language. (3 q.h.)

Italian

801. Italian Literature of the 14th Century. (3 q.h.)
802. Italian Renaissance. (3 q.h.)
803. Italian Neoclassicism. (3 q.h.)
811. Italian Romanticism. (3 q.h.)
812. The Italian Novel of the 19th Century. (3 q.h.)
813. Literature of New Italy. (3 q.h.)
821. Italian Literature of the First 40 Years of the 20th Century. (3 q.h.)
822. Regional Italian Literature. (3 q.h.)
823. Recent Italian Literature. (3 q.h.)
864. History of the Italian Language. (3 q.h.)
865-866. Comparative Romance Linguistics. (3 + 3 q.h.)
870, 871, 872. Special Reading and Research. (1-5, 1-5, 1-5 q.h.)
873, 874, 875. Seminar in Italian Language or Literature. (3, 3, 3 q.h.)

FOUNDATIONS OF EDUCATION

William Swan, *Chairman of the Department*

215C School of Education

870. Problems of the Classroom Teacher. (3 q.h.)
871. Pupil Problems. (3 q.h.)
872. Statistical Methods in Education. (3 q.h.)
873. Comparative Education. (3 q.h.)

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874. Audio-Visual Media. (4 q.h.)

880. Inner-City Educational Workshop. (3 q.h.)

900. *Education in Western Culture.* A basic history of educational thought, practice, and purpose in Western culture with emphasis on those factors influencing the emerging pattern of American education. 3 q.h.

901. *Philosophical Foundations of Educational Theory and Practice.* An examination of the basic philosophical premises upon which functional educational systems have been based. 3 q.h.

902. *Sociological Aspects of Contemporary Education.* A study of the implications for education of recent sociological developments with emphasis on inner-city problems, culturally disadvantaged students, and trends in family organization. 3 q.h.

904. *Educational Research.* An introduction to the techniques of educational research and elementary statistical concepts. Preparation of a written prospectus for a research problem will be required. Stress will be placed on the use of the library in the collection of data. Experience in interpreting research data will be provided in order to enable the student to adequately interpret the findings of educational research. Prereq.: Education 872, an equivalent course, or consent of instructor. 3 q.h.

905. *A History of American Education.* The development of educational practice in the United States. An examination of progress towards educational goals. Implications of historical backgrounds for present problems. Prereq.: graduate status. 3 q.h.

1000, 1001, 1002, 1003, 1004. *Seminar in Foundations of Education.* Study of selected issues and problems of current interest chosen by the staff; e.g.: community-environmental influences on the school, international education, demographic studies in re schools, and other selected topics. Prereq.: Graduate status and permission of instructor.

1-5 q.h., maximum total 15 q.h.

GEOGRAPHY

Michael Klasovsky, *Chairman of the Department*

15 School of Education

800. European Area Study. (9 q.h.)

802. Historical Geography of Anglo-America. (3 q.h.)

804. Political Geography. (3 q.h.)

GEOLOGY

C.E. Harris, *Chairman of the Department*

9G Ward Beecher Science Hall

806. Introduction to X-Ray Diffraction. (3 q.h.)

COURSES

807, 808, 809. *Earth Science*. An integrated course in Earth Science designed for secondary teachers of earth science and general science courses. A study of the earth and its environment in space. The various physical and chemical processes acting on and within the earth throughout geological time. Lunar geology and the solar system. Earth Science Curriculum Project material will be used. Prereq.: Certification for teaching in secondary schools or permission of the Chairman of the Department of Geology.

3 + 3 + 3 q.h.

GUIDANCE, COUNSELING, AND PUPIL PERSONNEL

Lawrence A. DiRusso, *Chairman of the Department*

206 Kilcawley Men's Residence

961. *Foundations of Guidance*. Introduction to purposes and practices of pupil-personnel work in elementary schools, secondary schools, and higher education. Lecture and discussion are used to explore the philosophy and scope of guidance; history of guidance and important current developments; planning, organizing, administering, and evaluating guidance programs; and the contributions of psychology, sociology, economics, and other disciplines related to guidance. 3 q.h.

962. *Counseling: Principles, Theory, Practice*. Basic principles of counseling in an educational context. Development of procedural bases for counseling and educationally-oriented counseling theory. Ethics and limitations involved in counseling practices. 3 q.h.

963. *Occupational and Educational Information In Guidance*. Principles of career development and use of educational and occupational information resources in the guidance program. Lecture and discussion are used to explore occupational structure of the United States, sources of educational and occupational information including community resources; and the collecting, classifying, filing, and organization of educational and occupational information for use in the guidance program. 3 q.h.

964. *Measurement and Evaluative Techniques*. Study of the tools and techniques of measurement and evaluation and their application in the guidance process. 3 q.h.

969. *Administration of Personnel and Guidance Services*. A comprehensive study of the dynamic qualities inherent in planning, management, functioning, and structuring of personnel and guidance services in public schools. 3 q.h.

970. *Guidance Services in Elementary, Junior High, and Middle Schools*. The study of guidance services provided in elementary, junior high, and middle schools. This includes individual and group testing methods, vocational guidance, counseling, counselor-parent relationships, referral pro-

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cedures, guidance of the disadvantaged and exceptional child, and the development of elementary, junior high, and middle school guidance programs. 3 q.h.

972. *Vocational Guidance in the Junior High and High School.* Theories of vocational choice and the development of programs and procedures in the junior high and high school to assist students in career planning. Emphasis is on vocational counseling theory and procedures; assessments of vocational and personal traits, abilities, and aptitudes; use of occupational information; and vocational counseling and placement of the disadvantaged and exceptional child. 3 q.h.

973. *Group Guidance and Group Counseling.* A study of group dynamics and the interpersonal process through which students within the normal range of adjustment work within a peer group under the direction of a professional counselor. Study and practical application of group guidance and group counseling procedures for meeting individual needs in an educational setting. 3 q.h.

974. *Case Studies in School Guidance and Field Experience in Community Social Agencies.* Methods of collecting data, synthesis, and interpretation of data about a person and his relationship to his environment. Real and assumed situations of pupils over an extended period of time are presented for study and analysis. The course includes practical field experience with various community social agencies to acquaint the student with agency services and social case-work methods. Particular emphasis is placed on the disadvantaged and exceptional child. 3-6 q.h.

1006. *Guidance in the Classroom.* Studies various factors important to a facilitative climate in the classroom and activities through which elementary counselors and teachers can provide these conditions. Considered are classroom management and discipline techniques based upon learning theory, implementation of democratic group structure for elementary school classrooms, and organized activities designed to promote the development of self understanding and understanding of others in the child's world. The course requires extensive reading and review of published materials designed for classroom guidance, in addition to observation of classrooms and role-playing experiences. 3 q.h.

1007. *Practicum for Visiting Teachers.* Visiting teacher practice under supervision; the final required course in the preparation of the visiting teacher, open to advanced students who are completing their work for the visiting teacher certificate. Internship experiences in neighboring elementary and secondary schools. A review of community organizations; field experiences in social agencies; seminar work in case studies. Prereq.: Consent of instructor. 6-9 q.h.

1008. *Counseling Internship for Elementary School Counselors.* The final required course for elementary school counselors open to students who are completing this work for elementary school counselor certification. Super-

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vised counseling internship for one (1) quarter in elementary school. Prereq.: Consent of instructor. 6-12 q.h.

1009. *Counseling Internship for Secondary School Counselors.* Counseling practice under supervision; the final required course in the preparation of the Secondary School Counselor. Open to advanced students who are completing their work for the school counselor certificate. Supervised counseling internship for one (1) quarter in secondary guidance. Prereq.: Consent of instructor. 6-12 q.h.

1011. *Counseling Laboratory Experience.* A study and application of counseling techniques in a laboratory setting that allows prospective counselors the opportunity to develop an individual style of counseling. Emphasis is on counselor self-awareness of the counselee and his needs. Prereq.: Ed. 962 and consent of instructor. 3 q.h.

1013, 1014, 1015. *Topical Seminar in Counseling.* The course is for practicing counselors and counselor trainees and will include a survey of literature in counseling, contemporary issues, individual and small group study of special problems chosen by staff, for example: research in counseling, counselor values and the counseling process, student values and drug abuse, team approach to counseling services, etc. Prereq.: Consent of instructor. 1-4 q.h. each seminar.

1016. *Counseling Laboratory for Elementary School Counselors.* Supervised roleplaying based upon a micro-counseling model designed to teach skills essential for counselors (e.g. accurate listening, reflections, and clarification of feeling). Students will study their own and their classmates counseling behavior through the use of video tape media. Major theoretical orientation such as behavioral counseling and client-centered counseling will be reviewed and counselor behaviors will be discussed in terms of these theoretical bases. Experience will also be provided in small group guidance activities. Prereq.: Ed. 962 and consent of instructor. 3 q.h.

HEALTH AND PHYSICAL EDUCATION

Lewis B. Ringer, *Chairman of the Department*

314 Jones Hall

- 860. Tests and Measurements. (4 q.h.)
- 880. Organization of Recreation and Intramural Programs. (4 q.h.)
- 891. Evaluation and Curriculum Development in Health. (4 q.h.)
- 896. Physiology of Exercise. (4 q.h.)

HISTORY

Hugh G. Earnhart, *Acting Chairman of the Department*

212 Arts and Sciences Office Building

- 701. Colonial America. (4 q.h.)

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702. The Revolution and the Constitution. (4 q.h.)
 704. The Federal Period of American History. (4 q.h.)
 706. The Middle Period of American History. (4 q.h.)
 708. The Civil War and Reconstruction. (4 q.h.)
 710. The Emergence of Modern America. (4 q.h.)
 712. Recent America. (4 q.h.)
 713. Contemporary America. (4 q.h.)
 715, 716. Economic History of the United States, I, II. (4 + 4 q.h.)
 717, 718. Constitutional History of the United States I, II. (4 + 4 q.h.)
 720, 721. Social and Cultural History of the United States I, II.
 (4 + 4 q.h.)
 723. The History of Ideas in America. (4 q.h.)
 730, 731. Black Man in American History I, II. (4 + 4 q.h.)
 732, 733. The West in American History I, II. (4 + 4 q.h.)
 735. Urban History. (4 q.h.)
 736. Urban History of the United States. (4 q.h.)
 738, 739. The South in American History I, II. (4 + 4 q.h.)
 741, 742. Diplomatic History of the United States, I, II. (4 + 4 q.h.)
 744. The History of American Business. (4 q.h.)
 751. Byzantine History. (4 q.h.)
 752. History of Greece. (4 q.h.)
 753. History of Rome. (4 q.h.)
 754. Early Middle Ages. (4 q.h.)
 755. Late Middle Ages. (4 q.h.)
 758. Renaissance Europe. (4 q.h.)
 759. The Reformation Era. (4 q.h.)
 760. From Westphalia (1648) to the French Revolution (1789). (4 q.h.)
 761. French Revolution and Napoleon. (4 q.h.)
 765. Europe from the Congress of Vienna to the Franco-Prussian War.
 (4 q.h.)
 766. Europe from the Franco-Prussian War to World War I. (4 q.h.)
 767. Europe from World War I to the Present. (4 q.h.)
 768, 769. History of Germany I, II. (4 + 4 q.h.)
 775. History of South and Southeast Asia in the 19th & 20th Century.
 (4 q.h.)
 777, 778. History of Russia I, II. (4 + 4 q.h.)
 779. History of the Soviet Union. (4 q.h.)
 780, 781. History of Eastern Europe I, II. (4 + 4 q.h.)
 782. History of the Balkans. (4 q.h.)
 783, 784. Economic History of Europe I, II. (4 + 4 q.h.)
 786. Expansion of Europe to 1815. (4 q.h.)
 787, 788. History of Population Movements I, II. (4 + 3 q.h.)
 790, 791. English History I, II. (4 + 4 q.h.)
 792, 793. British Empire and Commonwealth I, II. (4 + 4 q.h.)
 795. Historical Origins of Spanish Culture. (4 q.h.)
 796. The Ancient Near East. (4 q.h.)

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797. Early Islamic Civilization. (4 q.h.)
798. The Ottoman Empire. (4 q.h.)
799. The Middle East in Modern Times. (4 q.h.)
801. Selected Problems in American History. (4 q.h.)
850. European Area Study. (9 q.h.)
851. Selected Problems in European History. (4 q.h.)
901. *Historical Literature: American.* Readings in the standard works and monographic studies to meet the requirements of qualified graduate students who wish intensive concentration in specific areas of American history. (May be repeated with consent of instructor.) 4 q.h.
902. *Seminar in American Colonial History.* Selected problems of early American history. (May be repeated with consent of instructor.) 4 q.h.
903. *Seminar in 19th-Century America.* Selected problems of American history, 1800-1865. (May be repeated with consent of instructor.) 4 q.h.
904. *Seminar in 19th-Century America.* Selected problems of American history, 1865-1900. (May be repeated with consent of instructor.) 4 q.h.
905. *Seminar in 20th-Century America.* Selected problems of American history in the 20th Century. (May be repeated with consent of instructor.) 4 q.h.
906. *Historical Literature: European.* Readings in the standard works and monographic studies to meet the requirements of qualified graduate students who wish intensive concentration in European history. (May be repeated with consent of instructor.) 4 q.h.
912. *Seminar in Greek and Roman History.* The sources and problems of Greek and Roman history. (May be repeated with consent of instructor.) 4 q.h.
913. *Seminar in Medieval Culture and Society.* The main intellectual and social currents of the Middle Ages. (May be repeated with consent of instructor.) 4 q.h.
914. *Seminar in Renaissance and Reformation.* Trends and aspects of the Renaissance and Reformation. (May be repeated with consent of instructor.) 3 q.h.
915. *Seminar in 17th Century Europe.* Dutch Commercial Enterprise; the France of Louis XIV; Austria and the Empire; Emergence of Brandenburg-Prussia; Rise of Modern Science; the Age of Reason; the Development of the Baroque in Arts and Literature. 4 q.h.
916. *Seminar in 18th-Century Europe.* Selected areas of the Enlightenment, Old Regime, and the French Revolution. (May be repeated with consent of instructor.) 4 q.h.
917. *Seminar in 19th-Century Europe.* The Napoleonic and post-Napoleonic era and the rise of nationalism in Europe. (May be repeated with consent of instructor.) 4 q.h.

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918. *Seminar in 20th-Century Europe.* Investigation of the causes of the great world wars, the rise of totalitarianism and the cold war. (May be repeated with consent of instructor.) 4 q.h.

919. *Seminar in Russian History.* Selected problems of Russian history. (May be repeated with consent of instructor.) 4 q.h.

920. *Historical Literature: Asian.* Readings in the standard works and monographic studies to meet the requirements of qualified graduate students who wish intensive concentration in Asian history. (May be repeated with consent of instructor.) 4 q.h.

921. *Seminar in Asian History.* Selected problems in the political, social, economic, diplomatic, and intellectual history of traditional or modern East Asia. (May be repeated with consent of instructor.) 4 q.h.

922. *Seminar in British Empire.* An examination of major problems confronting the British Empire after 1783. (May be repeated with consent of instructor.) 4 q.h.

923. *Seminar in Middle Eastern History.* This course will deal at various times with topics drawn from the Ancient Near East down to the contemporary clash of nationalisms in the Middle East. (May be repeated with consent of instructor.) 4 q.h.

925. *Seminar in English History.* An examination of selected problems in the political, social, economic, and intellectual history of England. (May be repeated with consent of instructor.) 4 q.h.

930. *The Teaching of History in Institutions of Higher Learning.* Investigation and discussion of professional teaching of history at the college level; course construction, presentation of subject matter, testing, instructional aids, evaluation of instruction. Required of all graduate assistants. 1 q.h.

931. *Research.*

1 q.h.

1-9 q.h.

949. *Historiography: American.* An introduction to the professional study of American history, including an examination of the sources and nature of historical knowledge, historical criticism, and synthesis. Required of all candidates for advanced degrees with concentration in the field of American history. 4 q.h.

950. *Historiography: European.* An introduction to the professional study of European history including an examination of the sources and nature of historical knowledge, historical criticism, and synthesis. Required of all candidates for advanced degrees with concentration in the field of European history. 4 q.h.

INDUSTRIAL ENGINEERING

Robert Sorokach, *Chairman of the Department*

238 Engineering Science Building

COURSES

901. *Optimization Techniques.* A study of the analytical techniques used in operations research and industrial engineering with special emphasis on their application to problems in all engineering disciplines. Background in areas such as probability and statistical techniques, least square methods, correlation and regression analysis, interpolation, and iterative methods will be presented. Algorithms for linear programming, integer programming, parametric programming, and dynamic programming models will be developed.

4 q.h.

902. *Digital Simulation.* An introduction to methods of simulation using the digital computer. The generation of random numbers, Monte Carlo techniques, queueing models, and error analysis will be presented. The student will be provided the opportunity to simulate moderately complex physical systems on the digital computer. Primary emphasis will be on models of industrial operations. Prereq.: I.E. 901 and digital programming experience.

4 q.h.

MANAGEMENT

Dumitru Teodorescu, *Chairman of the Department*

513 Lincoln Project

750. Human Behavior in Organization. (4 q.h.)

835. Advanced Business Finance. (4 q.h.)

850. Development of Executive Ability. (4 q.h.)

851. Problems in Industrial Management. (3 q.h.)

855. Business Ethics. (2 q.h.)

915. *Research Techniques.* Nature, methods and techniques of research and the use of research by management; the scientific method in business, sampling theory, variable analysis and research cases.

3 q.h.

921. *Financial Administration.* A study through case analysis of business financing, primarily through the use of long-term funds and from the viewpoint of the chief financial officer. The course is concerned with money and credits, business cycles, and present-value concepts; the formation and expansion of capital structures from the standpoints of the owner-manager, the creditors and potential investors, and includes the pricing and marketing of new security issues; new business financing, mergers, reorganizations, and bankruptcies.

3 q.h.

922. *Capital Management.* Managerial economics of capital budgeting, sourcing, rationing and control for large enterprises; forecasting demand and internal generation of capital; estimating costs of capital; measuring productivity of capital; intangible capital investments; administration of capital appropriations; public policy implications.

3 q.h.

951. *Theory of Organization.* Building on the coverage of leadership and organization provided in the prerequisite courses, study here is directed to integrating frameworks which cover the whole organizational activity, as

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well as partial models dealing with growth, structure, purpose, and so forth. Theories which view the organization as a producing instrument (the machine model), as a network of relations (Barnard), and as a complex of resources, actions and relations (Bakke) make up one part of the course. The balance is devoted to more limited models dealing with group processes, leadership, communication, decisions, and to some considerations in theorizing such as the use of analogy, the normative instinct, and the application of theory in a business setting. 4 q.h.

952. *Management Theory and Thought.* An approach to modern management thought and theory by an analysis and study of the 19th and 20th century literature on the subject. An investigation of fundamental concepts of management and administration. 3 q.h.

961. *Behavioral Sciences in Management.* An introduction to the psychology of learning, perception, motivation and problem-solving. The course concentrates on dealing with individual effectiveness in organization. Examples of specific topics are: job satisfaction, supervision, planning and resistance to change. Two hours in laboratory and two hours of lecture. 4 q.h.

963. *Industrial Relations.* Analysis of managerial and organizational aspects of employee relations arising out of relations with union, negotiation, and application of contracts, living with contracts, and pertinent legislative matters. 3 q.h.

965. *Business Policies.* The correlation of theory and practice in the development of business policies. Emphasis will be on the problems of executive management, decision-making and administrative action. 3 q.h.

966. *Advanced Production Management.* Applies the system philosophy to the organization of the production function. The primary emphasis is on costs and the tools available to control them. The attitude of the work is strongly profit oriented. The course covers those areas under the control of the production manager plus his relationship to engineering, industrial relations, data processing, the comptroller and sales. 3 q.h.

969. *Advanced Management Seminar.* An analysis in depth of several strategically important areas of management in which theory, research, and practice have progressed significantly in recent years. The applicability, potential and actual, of the newer concepts. Areas considered are: long range planning, management organization development, systems management, executive decision-making, organizational behavior, control techniques, and other selected topics. 3 q.h.

996. *Research Problems Other Than Thesis.* Special projects undertaken by M.B.A. students under the direction of faculty members of professorial rank. The exact number to be used will be determined by the nature of the project. Credit will be determined in each case in the light of the nature and extent of the project. 1-6 q.h.

998. *Thesis.* 6 q.h.

MARKETING

George L. Almond, *Chairman of the Department*

615 Lincoln Project.

815. Marketing Research. (4 q.h.)

820. Sales Promotion. (3 q.h.)

825. Marketing Management. (3 q.h.)

845. International Marketing. (3 q.h.)

915. *Research Techniques.* Nature, methods and techniques of research and the use of research by management; the scientific method in business, sampling theory, variable analysis and research cases. 3 q.h.

941. *Marketing Theory.* A critical appraisal of emerging marketing concepts, their development, acceptance and expected future direction; focus on the role of marketing in the overall economy rather than within the firm. 3 q.h.

943. *Physical Distribution Management.* Problems encountered in the movement of goods from the end of the production line to the ultimate consumer; consideration of total distribution and its application in the designs and reconstruction of distribution systems. The relationships between materials handling, warehousing, inventory carrying, and transportation costs are explored together with methods of analysis designed to disclose optimum combinations. 3 q.h.

944. *Product Management.* The search for new product ideas and their evaluation; the organizational structure necessary to the development and introduction of new products and the management of a product line; the commercial aspects of product design, packaging, labeling, and branding; considerations involved in making product deletion decisions. 3 q.h.

996. *Research Problems Other Than Thesis.* Special projects undertaken by M.B.A. students under the direction of faculty members of professorial rank. The exact number to be used will be determined by the nature of the project. Credit will be determined in each case in the light of the nature and extent of the project. 1-6 q.h.

998. *Thesis.*

6 q.h.

MATHEMATICS

Gus Mavrigian, *Acting Chairman of the Department*

233 Engineering Science Building

701. Introduction to Set Theory. (4 q.h.)

705, 706. Differential Equations I, II. (4 + 4 q.h.)

709. Ordinary Differential Equations. (3 q.h.)

710, 711. Higher Mathematics for Engineers and Physicists I, II.

(3 + 3 q.h.)

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725. Matrix Theory and Linear Algebra. (4 q.h.)
726. Theory of Equations. (4 q.h.)
- 727, 728. Abstract Algebra I, II. (4 + 5 q.h.)
730. Foundations of Geometry. (4 q.h.)
732. Projective Geometry. (4 q.h.)
- 740, 741, 742. Mathematical Statistics I, II, III. (3 + 3 + 3 q.h.)
750. History of Mathematics. (4 q.h.)
760. Numerical Analysis. (4 q.h.)
842. Statistical Inference. (4 q.h.)
- 843, 844. Theory of Probability I, II. (4 + 4 q.h.)
845. Operations Research. (4 q.h.)
860. Mathematical Logic. (4 q.h.)
861. Advanced Numerical Analysis. (4 q.h.)
- 871, 872. Advanced Calculus I, II. (5 + 5 q.h.)
875. Introduction to Complex Variables. (4 q.h.)
880. Introduction to Topology. (4 q.h.)
890. Mathematics Seminar. (2 q.h.)
901. *Topics in Analysis*. A course in analysis aimed at providing secondary school teachers with a broad understanding of the subject. Prereq.: Departmental permission. 5 q.h.
902. *Topics in Modern Algebra*. A course in modern algebra aimed at providing secondary school teachers with a broad understanding of the subject. Prereq.: Departmental permission. 5 q.h.
- 910, 911. *Advanced Engineering Mathematics I*. A presentation of methods in applied mathematics. Selected topics may include: differential equations, infinite series, linear spaces and operators, matrices and determinants, functions of a complex variable, special functions of mathematical physics, operational calculus, and partial differential equations. Emphasis is placed on applications to engineering. Prereq.: Math. 710 or consent of instructor. 4 + 4 q.h.
- 920, 921, 922. *Modern Algebra I, II, III*. A study of algebraic theories. Finite groups, field extensions and Galois theory, rings, modules, and multilinear algebra. Prereq.: Math. 728. 3 + 3 + 3 q.h.
930. *Differential Geometry*. The classical differential geometry of curves and surfaces, with tensors. Prereq.: Math. 709, 872. 4 q.h.
- 945, 946, 947. *Stochastic Processes I, II, III*. A study of Markov chains, Poisson processes, Wiener processes, and renewal processes with applications to queueing and traffic, system reliability, epidemics, and inventory. Prereq.: Mathematics 848 and 875. 3 + 3 + 3 q.h.
948. *Analysis of Variance*. A study of linear statistical models of the relationship between analysis of variance and regression and of the assumptions underlying the analysis of variance. Prereq.: Mathematics 725 and 742. 4 q.h.

COURSES

950. *Infinite Series*. An extensive treatment of convergent and divergent series including a strong emphasis on summability methods of divergent series. Prereq.: Mathematics 871. 4 q.h.

952. *Advanced Differential Equations*. Theory of differential equations including a study of fundamental existence and uniqueness theorems for solutions. Further topics selected from: phase plane analysis, stability theory, boundary value problems, partial differential equations, integral equations, applications. Prereq.: Math. 705, Math. 725 and either Math. 872 or Math. 911, or consent of instructor. 4 q.h.

960. *Mathematical Logic II*. A study of the elements of recursive function theory and topics such as Godel's incompleteness theorem and decision problems for theories. Prereq.: Math. 860 or consent of instructor. 4 q.h.

965, 966. *Introduction to Real Analysis I, II*. Calculus in n-dimensional Euclidean spaces. Riemann and Lebesgue integration and related topics. Prereq.: Math. 872. 3 + 3 q.h.

971, 972, 973. *Real and Abstract Analysis I, II, III*. Introduction to general measure theory and functional analysis. The radon-Nikodym theorem, the Fubini theorem, the Hahn-Banach theorem, the closed graph and open mapping theorems, weak topology. Prereq.: Math. 966. 3 + 3 + 3 q.h.

975, 976, 977. *Complex Analysis I, II, III*. A course in classical complex analysis. The Cauchy theorem, the Weierstrass, Mittag-Leffler, Picard, and Riemann theorems, Riemann surfaces, harmonic functions. Prereq.: Math. 872, 875, 880. 3 + 3 + 3 q.h.

980, 981, 982. *Topology I, II, III*. A further study of topological spaces. Separation, metrization, compactification. Additional topics will be selected from the following: point-set topology, algebraic topology, combinatorial topology, topological algebra. Prereq.: Math. 880. 3 + 3 + 3 q.h.

990. *Independent Study*. Study under the supervision of a staff member. May be repeated. Prereq.: Permission of the department chairman. 1-5 q.h.

999. *Research and Thesis*. 3-9 q.h.

MECHANICAL ENGINEERING

Frank A. D'Isa, *Chairman of the Department*

201 Engineering Science Building

720. Heat Transfer I. (3 q.h.)

750. Strength of Materials III. (3 q.h.)

804. Applied Thermodynamics. (4 q.h.)

821. Heat Transfer II. (4 q.h.)

830. Fluid Mechanics. (4 q.h.)

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- 851. Strength of Materials IV. (4 q.h.)
- 870. Mechanical Vibrations. (4 q.h.)
- 881. Engineering Analysis. (4 q.h.)
- 882. Mechanical Engineering Problems. (4 q.h.)
- 892. Control Theory. (Not for Electrical Engineering Majors.) (4 q.h.)

904. *Advanced Thermodynamics*. Laws of equilibrium thermodynamics; relations between properties and aspects of the Second-Law. Macroscopic and microscopic considerations for the prediction of properties. Microscopic description based on classical and quantum statistics. General stability criteria, statistical equilibrium, and trend toward equilibrium fluctuations. 4 q.h.

922. *Advanced Heat Transfer*. Selected topics in steady-state and transient conduction heat transfer emphasizing techniques used in the solution of practical engineering problems. The solutions of Bessel and Legendre equations. Prereq.: M.E. 720 or equivalent course. 4 q.h.

923. *Advanced Convective Heat Transfer*. Heat transfer with fluids flowing in ducts, including entrance length effects; laminar and turbulent thermal boundary layers; natural convection; Reynold's analogy; special topics in heat transfer drawn from areas of boiling, condensation, or compressible flows. Prereq.: M.E. 821 or equivalent course. 4 q.h.

931. *Gasdynamics*. The application of fluid mechanic and thermodynamic principles to compressible flows: wave motion, the hodograph method, the method of characteristics, the shock tube, and airfoil theory. High velocity flow in ducts and impellers. Laboratory experiments. Prereq.: M.E. 830 or equivalent course. 4 q.h.

933. *Ideal Fluid Flows*. Kinematics of fluid flow and conservation laws. Vorticity, circulation, and vortex motion. Derivation of velocity potentials and stream functions. Potential flows in two and three dimensions; conformal transformations; free streamline theory. Prereq.: M.E. 830 or equivalent course. 4 q.h.

934. *Viscous Fluid Flows*. Derivation of the Navier-Stokes equations. Exact solutions of Navier-Stokes equations and boundary layer analysis. General methods of solution, introduction to hydrodynamic stability and turbulence. Prereq.: M.E. 830 or equivalent course. 4 q.h.

935. *Lubrication*. Lubrication theory and bearing design. Dry friction, boundary and thin film lubrication. Theory and application of hydrodynamic and hydrostatic lubrication to journal and thrust bearings. Bearing metals and lubrication systems. Prereq.: M.E. 830 or equivalent course. 4 q.h.

943. *Advanced Dynamics I*. Three-dimensional vector statics; kinematics and kinetics of particles and rigid bodies; energy, momentum, stability; application of LaGrange's equations to machinery, vehicles, ballistics; gyroscope. 4 q.h.

944. *Advanced Dynamics II*. LaGrange's equations of motion for

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particles and rigid bodies; impulse; small oscillations; non-holomic and dissipative systems. Hamiltonian systems; applications to intricate engineering problems. Prereq.: M.E. 943. 4 q.h.

952. *Applied Elasticity*. Equations of equilibrium, compatibility and boundary conditions; their applications to plane stress and plane strain problems. Stress functions, strain energy methods, stress distribution in axially symmetrical bodies; special problems in structures involving torsion and bending of prismatical bars. Prereq.: M.E. 750 or equivalent course; M.E. 986. 4 q.h.

955. *Applied Plasticity*. Equations for yield criteria and stress-strain relations; their application to elasto-plastic and fully plastic problems considering strain hardening. Introduction to limit analysis and creep. Prereq.: M.E. 952 Applied Elasticity. 4 q.h.

962. *Mechanical Design Analysis*. The study of analytical aspects and the application of engineering science topics to machine elements and machinery. Some case studies in mechanical design. 4 q.h.

963. *Experimental Stress Analysis*. Theory and engineering applications of the most recent techniques of experimental stress analysis; brittle coatings, photoelasticity, strain gages, photostress. Prereq.: M.E. 750 or equivalent course. 4 q.h.

982. *Advanced Engineering Analysis*. An integration of the fundamental laws and principles of basic science to obtain practical solutions of engineering problems. Formulation of mathematical models for complex physical situations and the organization of computational programs for their solutions. Examples of lumped and distributed parameter systems chosen from the areas of mechanics, thermodynamics, heat transfer, and electrical circuit theory. Prereq.: M.E. 881 or equivalent course. 4 q.h.

986. *Theory of Continuous Medium*. General discussion of Cartesian tensors. Application of tensor theory to elasticity, fluid flow, and dynamics. General analysis of continuous medium. 4 q.h.

990. *Thesis*. 2-9 q.h.

991. *Thesis*. 2-9 q.h.

992. *Graduate Projects*. Analysis, design, research, or other independent investigation on projects selected, with the advice and approval of the students' graduate committee. Hours of credit to be assigned. 4 q.h.

MATERIALS SCIENCE

Tadeusz K. Slawewski *Chairman of the Department of
Chemical Engineering and Materials Science*

225 Engineering Science Building

815, 816. Particle Interaction I, II. (3 + 3 q.h.)

817. Management of Nuclear By-Products. (1 q.h.)

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830, 831, 835. Introduction to Nuclear Materials I, II, III. (3 + 3 + 3 q.h.)

860. Mechanical Behavior of Materials. (3 q.h.)

861, 862. Applied X-Rays I, II. (3 + 3 q.h.)

863, 864. Thermodynamics of Materials I, II. (3 + 3 q.h.)

865. Advanced Science of Materials. (3 q.h.)

866. Special Topics. (3 q.h.)

871. Physical Metallurgy IV. (3 q.h.)

872. Refractory Metals and Alloys. (3 q.h.)

890. Metallurgy and Materials Colloquium. (1 q.h.)

901, 902. *Fundamentals of Material Science I, II.* (Designed for students who are entering the Graduate School without a degree in metallurgical engineering.) Discussion of physics of solids, mechanical properties, phase diagrams, phase transformations, and alloys. (Generally, in addition to the general requirements of the program.) Prereq.: Consent of advisor. 4 + 4 q.h.

910. *Extractive and Process Metallurgy.* An advanced treatment of the physicochemical principles of extractive and process metallurgy. Prereq.: Met. Engr. 793 and 863 or consent of instructor. 4 q.h.

920, 921. *Advanced Physical Metallurgy I and II.* Theoretical treatment of various aspects of physical metallurgy. Prereq.: Met. Engr. 793 and Met. Engr. 863 or consent of instructor. 4 + 4 q.h.

922, 923. *Advanced Mechanical Properties of Materials I and II.* Discussion of the mechanical properties from theoretical viewpoints; theory of elasticity, theory of plasticity, and other theories. Applications of theories to practical problems. Prereq.: Met. Engr. 860 or consent of instructor. 4 q.h.

931. *Engineering Alloys.* Alloy steels, refractory alloys, special non-ferrous alloys; their properties, heat treatment, and behavior under special conditions. Prereq.: Met. Engr. 732 and 793 or consent of instructor. 4 q.h.

932. *Industrial Metallurgy.* The application of physical metallurgy principles to the solution of problems concerning the causes of failure. Prereq.: Met. Engr. 793 or consent of advisor. 2 q.h.

933. *Chemical Metallurgy.* An advanced course on the application of electrochemical principles to metallurgical problems. Prereq.: Met. Engr. 793 and 863 or consent of advisor. 2 q.h.

951. *Introduction to Electron Microscopy and Field Ion Microscopy.* This course is designed to teach students how to use the microscopes to prepare specimens, to take photographs, and to analyze data. Laboratory work of about six hours a week. Prereq.: Met. Engr. 861. 2 q.h.

952. *Dislocations and Plastic Flow.* Properties of dislocations and their role in plastic flow of metals and alloys. Prereq.: Met. Engr. 860 or consent of instructor. 4 q.h.

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953. *Thermodynamics of Solids*. Solutions and applications of statistical thermodynamics to the study of alloys. Prereq.: Met. Engr. 863 and 865 or consent of instructor. 4 q.h.
954. *Advanced Polymer Science*. Advanced discussion of the Polymer Science with particular emphasis on the engineering and fundamental aspects. Prereq.: Met. Engr. 851 or consent of instructor. 4 q.h.
955. *Advanced Refractory Material*. Discussion of refractory materials. Prereq.: Met. Engr. 852 or consent of instructor. 4 q.h.
956. *Advanced Nuclear Materials*. Advanced discussion of the nuclear material with particular emphasis on reaction kinetics and reaction technology. Prereq.: Met. Engr. 830 or consent of instructor. 4 q.h.
960. *Research Seminar*. Prereq.: Consent of instructor. 1 q.h.
990. *Thesis I and II*. 3 + 3 q.h.
- 993, 994. *Solid State Structure and Reactions I, II*. Discussion of structures and properties of materials, electronic properties, mechanical properties, kinetics of phase changes, diffusion controlled and diffusionless transformation in materials. Limited to those having certification in secondary science teaching acceptable in the State of Ohio. Prereq.: Consent of instructor. 3, 3 q.h.

MUSIC

Charles H. Aurand, Jr., *Dean*

103 Dana School of Music

741. Piano Literature. (4 q.h.)
753. Counterpoint I. (3 q.h.)
754. Counterpoint II. (3 q.h.)
863. Choral Literature. (3 q.h.)
869. Organ Literature and Service Playing. (3 q.h.)
871. Baroque Music. (3 q.h.)
872. 18th Century and the Viennese Classical School. (3 q.h.)
874. 19th Century Romantic Period. (3 q.h.)
875. Contemporary Music. (3 q.h.)
879. Vocal Literature. (3 q.h.)

Applied Music

Recital 999. One or more public performances of literature representative of that most respected in the pertinent applied field. Credit depends on content and scope of the performance and must be approved by the Dean of the School of Music. 1-6 q.h.

Baritone Horn

Major Course

A907-A908-A909. Studies by Kahila, Lafosse, Schlossberg, and Bla-

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zevich. Solos by Fosch, Giffels, Beasley, Bach, and Bozza. 3 + 3 + 3 q.h.

Major Course for Music Education

A904-A905-A906. See Baritone Horn A907-A908-A909. 2 + 2 + 2 q.h.

Minor Course

A901-A902-A903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Harpichord

G901-G902-G903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Piano

Major Course

K907-K908-K909. Bach, *Chromatic Fantasy and Fugue*; Beethoven, late works; Schumann and Brahms, larger works; Prokofiev, *Sonatas*; advanced technical studies and etudes. Preparation of recital. 3 + 3 + 3 q.h.

Major Course for Music Education

K904-K905-K906. See, Piano K907-K908-K909. 2 + 2 + 2 q.h.

Minor Course

K901-K902-K903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Organ

Major Courses

I907-I908-I909. Bach, *Trio Sonata No. 5, Toccata and Fugue in F*; Mozart, *Fantasies*; Reubke, *Sonata on the 94th Psalm*; Dupre, *Variations on a Noel*; Hindemith, *Sonatas*. Preparation of recital. 3 + 3 + 3 q.h.

Major Course for Music Education

I904-I905-I906. See, Organ I907-I908-I909. 2 + 2 + 2 q.h.

Minor Course

I901-I902-I903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Voice

Major Course

R907-R908-R909. Advanced vocal technique and literature; development of interpretation and characterization. Repertoire for each quarter centered around the ability to sing nine new songs accurately, two chosen from the modern French repertoire and two from British and American art songs, with six of these memorized. The graduate voice major should have extensive experience in songs in Italian, German, French, and English; oratorio

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and opera arias, solo cantatas, and contemporary solos. Preparation of recital. 3 + 3 + 3 q.h.

Major Course for Music Education

R904-R905-R906. *See*, Voice R907-R908-R909. 2 + 2 + 2 q.h.

Minor Course

R901-R902-R903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Violin

Major Course

Q907-Q908-Q909. Advanced concert etudes by Paganini, Bach, *Partitas* and *Sonatas*. Modern repertoire from Bartok, Hindemith, and Prokofiev. Concertos by Brahms and Tchaikovsky. Preparation of recital. 3 + 3 + 3 q.h.

Major Course for Music Education

Q904-Q905-Q906. *See*, Violin Q907-Q908-Q909. 2 + 2 + 2 q.h.

Minor Course

Q901-Q902-Q903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Viola

Major Course

P907-P908-P909. Studies by Garnies and Dolesje; sonatas by Hindemith, Bach and Beethoven; concerto by Haydn; solos such as Bloch, *Rhapsodie*; scales, arpeggios, and double-stops for the complete range of the instrument based on Flesch and Sevcik. Preparation of recital. 3 + 3 + 3 q.h.

Major Course for Music Education

P904-P905-P906. *See*, Viola P907-P908-P909. 2 + 2 + 2 q.h.

Minor Course

P901-P902-P903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Cello

Major Course

C907-C908-C909. Scales and arpeggios in four octaves with varied bowings, and in thirds and sixths; Popper, *Etudes*, Op. 73; Duport, *21 Etudes*; Schubert, *Arpeggione Sonata*; Debussy, *Sonata*; Prokofiev, *Sonata*, Op. 119; concertos by Schumann or Shostakovich. Preparation of recital. 3 + 3 + 3 q.h.

Major Course for Music Education

C904-C905-C906. *See*, Violincello C907-C908-C909. 2 + 2 + 2 q.h.

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Minor Course

C901-C902-C903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

String Bass

Major Course

L907-L908-L909. Simandl, *Etudes*; Hrabě, *Studies*; Zimmerman, *Orchestral Studies*; sonatas by Marcello, Eccles, or Vivaldi; concertos by Dittersdorf or Bottesini. Preparation of recital. 3 + 3 + 3 q.h.

Major Course for Music Education

L904-L905-L906. *See*, String Bass L907-L908-L909. 2 + 2 + 2 q.h.

Minor Course

L901-L902-L903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Flute

Major Course

E907-E908-E909. Studies such as Anderson, Op. 60; Bitsch, *12 Etudes*; Bozza, *14 Etudes arabesques*; sonatas by Duquis, Felt, Casterede, Houdy, Prokofiev; solos such as Jolivet, *Chant de Linos* and Messiaen, *Le Merle noir*. Preparation of recital. 3 + 3 + 3 q.h.

Major Course for Music Education

E904-E905-E906. *See*, Flute E907-E908-E909. 2 + 2 + 2 q.h.

Minor Course

E901-E902-E903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Oboe

Major Course

H907-H908-H909. Studies such as Ferling, 48 Studies; Andraud, *Vademecum*; sonatas by Dutilleux and Schuller; concerti by Mozart, Vaughan Williams, and Milhaud. Preparation of recital. 3 + 3 + 3 q.h.

Major Course for Music Education

H904-H905-H906. *See*, Oboe H907-H908-H909. 2 + 2 + 2 q.h.

Minor Course

H901-H902-H903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Clarinet

Major Course

D907-D908-D909. Studies such as Bozza, *15 Difficult Etudes*; Polatschek,

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28 *Advanced Studies*; Paganini, *15 Etudes*; concerti by Bozza, Nielsen, Poulenc, and Copland; Berg, *Four Pieces for Clarinet*; orchestral studies and Paris Conservatory solos. Preparation of recital. 3 + 3 + 3 q.h.

Major Course for Music Education

D904-D905-D906. *See*, Clarinet D907-D908-D909. 2 + 2 + 2 q.h.

Minor Course

D901-D902-D903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Bassoon

Major Course

B907-B908-B909. Studies such as Milde, Op. 26, Vol 2; Gambaro, *18 Studies*; Bozza, *Concertino*, Op. 46; concerti by Jacob, Weber, and Bruns; Pierne, *Theme and Variations*. Preparation of recital. 3 + 3 + 3 q.h.

Major Course for Music Education

B904-B905-B906. *See*, Bassoon B907-B908-B909. 2 + 2 + 2 q.h.

Minor Course

B901-B902-B903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Trumpet

Major Course

N907-N908-N909. Orchestral studies. Extensive development in the study of transposition; advanced studies by Charlier, Bozza, Brandt, Bodet, Broiles, Perrin, and Tomasi; solos by Bozza, Bitsch, Giannini, Beversdorf, Hummel, and Purcell. Preparation of recital. 3 + 3 + 3 q.h.

Major Course for Music Education

N904-N905-N906. *See*, Trumpet N907-N908-N909. 2 + 2 + 2 q.h.

Minor Course

N901-N902-N903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

French Horn

Major Course

F907-F908-F909. Advanced studies by Bitsch, Chaynes, Ceccarossi, Reynolds, Alphonse, and Schuller; demanding orchestral and ensemble passages; classical, romantic, and contemporary sonatas and concerti. Preparation of recital. 3 + 3 + 3 q.h.

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Major Course for Music Education

F904-F905-F906. *See*, French horn F907-F908-F909. 2 + 2 + 2 q.h.

Minor Course

F901-F902-F903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Trombone

Major Course

M907-M908-M909. Studies by Lafosse, Kahila, Ostrander, and Delguidice; solos by Creston, Bloch; transcriptions of Bach *Cello Suites* and C.P.E. Bach; orchestra excerpts by Stoneberg and Brown. Preparation of recital. 3 + 3 + 3 q.h.

Major Course for Music Education

M904-M905-M906. *See*, Trombone M907-M908-M909. 2 + 2 + 2 q.h.

Minor Course

M901-M902-M903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Tuba

Major Course

O907-O908-O909. Studies by Sear, Bernard, Vasilieu and others; solos by Beversdorf, Vaughn Williams, Hindemith, and Persichetti; *Horn Concerti* of Strauss and Mozart; orchestral studies by Sear. Preparation of recital. 3 + 3 + 3 q.h.

Major Course for Music Education

O904-O905-O906. *See*, Tuba O907-O908-O909. 2 + 2 + 2 q.h.

Minor Course

O901-O902-O903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Percussion

Major Course

J907-J908-J909. Snare drum: studies such as Albright, *Contemporary Studies for Snare Drum*; Delecluse, *Douze Etudes pour Gaiße Claire*; Wisler, *Polyrhythmic Independence for Hands and Feet*; excerpts from contemporary symphonic literature. Mallet and keyboard percussion: Land, Bach *Inventions*; Voxman, *Selected Studies*. Tympani: Remsen, *Contemporary Tympani Studies*; First, *Solo Tympanist*; solos for percussion instruments by Desportes, Petit, Baudo, Bigot, and others. Preparation of recital. 3 + 3 + 3 q.h.

Major Course for Music Education

J904-J905-J906.

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See, Percussion J907-J908-J909. 2 + 2 + 2 q.h.

Minor Course

J901-J902-J903. Materials adapted to pupil's needs. 1 + 1 + 1 q.h.

Theory and Composition

910, 911, 912. *Music Styles*. The study and application of 18th, 19th, and 20th century compositional techniques. 3 + 3 + 3 q.h.

913. *Pedagogy of Theory*. The study and critical analysis of methods for teaching harmony, sightsinging, and ear-training. 3 q.h.

916. *Fugue*. Analysis of the fugal style used in 17th century trio sonatas, and in both volumes of *The Well-Tempered Clavier* by J.S. Bach. Writing 3-4 voice fugues employing imitative and invertible counterpoint. Prereq.: Music 753 (Counterpoint I) or 754 (Counterpoint II). 3 q.h.

920, 921, 922. *Seminar in Materials of Music*. The study of techniques used in musical composition with emphasis in analyzing and writing. Course requirements will be determined by student's field of interest. Can be repeated for credit. Admission to course by permission of instructor. 3 + 3 + 3 q.h.

923, 924, 925. *Advanced Composition*. By permission of instructor only. Working in the larger forms, for chorus, orchestra, or chamber ensembles. 3 + 3 + 3 q.h.

Music History and Literature

940. *Music in the Middle Ages*. The development of polyphonic music from early organum to about 1450, with emphasis on techniques, styles, and forms. Seminar, with readings, reports, and musical illustrations. Prereq.: Music 782. 3 q.h.

941. *Music in the Renaissance*. Musical developments from about 1450-1600 dealing with the vocal music of this period, both sacred and secular, and the formulation of independent instrumental styles. Seminar, with readings, reports, and musical illustrations. 3 q.h.

942. *Introduction to Musicology*. Fundamental concepts and problems of musicology; sources, reference materials, methodology. 3 q.h.

943. *Seminar in Musicology*. An examination of selected problems in musicology. (May be repeated with consent of instructor.) 3 q.h.

944, 945. *Direction of Master's Thesis*. Open to candidates for the Master of Music degree upon petition to the Dana School of Music. Approval given after student's thesis topic has been approved and his advisor assigned. 3 + 3 q.h.

Music Education

970. *Foundations of Music Education*. An examination of basic prin-

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principles and techniques of music instruction; contemporary trends viewed from historical perspective. 3 q.h.

971. *Administration and Supervision in Music Education.* The functions and techniques of music supervision and administration; improvement of instruction; problems of music consultants; organization of in-service programs; public and staff relations. 3 q.h.

972. *Seminar in Music Education.* Individual projects and discussion of fundamental issues in music education. 3 q.h.

973. *Research Methods and Materials in Music Education.* A study of research tools and techniques and their application to problems in music education; critique of research studies; research report required in non-thesis Music Education program. 3 q.h.

974. *Psychology of Music.* Factors in the development of musical skills; a survey of the experimental literature in the field. 3 q.h.

975. *Music and the Humanities.* Designed to aid in the development of interdisciplinary courses involving music and the humanities in the secondary school. 3 q.h.

976. *Directed Study in Conducting.* Study of significant works, vocal or instrumental; special problems in conducting. May be repeated for credit. 3 q.h.

977. *Comparative Music Education.* The study of music education practices in world cultures, including the contributions of Orff, Kodaly, and Suzuki. 3 q.h.

980. *Independent Projects in Music.* Independent projects in music of a library, laboratory or field work nature designed to meet the needs of the student. Approval by major advisor with concurrence of the dean. 1-9 q.h.

PHILOSOPHY AND RELIGIOUS STUDIES

Martin A. Greenman, *Chairman of the Department*

100 Arts and Sciences Office Building

800. Theories of Knowledge. (4 q.h.)

802. Theories of Value. (4 q.h.)

810. Philosophical Classics. (4 q.h.)

811. Philosophy in America. (4 q.h.)

812. Contemporary Philosophy. (4 q.h.)

814. Analytic Philosophy. (4 q.h.)

815. Existentialism and Phenomenology. (4 q.h.)

820. Seminar: Contemporary Philosophical Problems. (1-3 q.h.)

821. Seminar: Areas of Philosophy. (1-3 q.h.)

PHYSICS AND ASTRONOMY

Frank M. Ellis, *Chairman of the Department*

COURSES

101B Ward Beecher Science Hall

701, 702, 703. Intermediate Classical Mechanics. (3 + 3 + 3 q.h.)

704, 705. Introduction to Modern Physics. (3 + 3 q.h.)

704L, 705L. Introduction to Modern Physics Lab. (1 + 1 q.h.)

710, 711, 712. Thermodynamics and Statistical Mechanics.

(3 + 3 + 3 q.h.)

730, 731, 732. Intermediate Electricity and Magnetism.

(3 + 3 + 3 q.h.)

730L, 731L, 732L. Intermediate Electricity and Magnetism Lab.

(1 + 1 + 1 q.h.)

810. Introduction to Quantum Mechanics. (3 q.h.)

811. Introduction to Quantum Mechanics. (3 q.h.)

826. Elements of Nuclear Physics. (3 q.h.)

826L. Nuclear Physics Laboratory. (1 q.h.)

830. Solid State Physics. (4 q.h.)

835. Spectroscopy. (4 q.h.)

901, 902. *Classical Mechanics I, II*. Variational principles and Lagrangian equations. The two-body central force problem. Kinematics and dynamics of rigid bodies. Hamiltonian equation of motion; Hamilton-Jacobi theory. Prereq.: Physics 702 and Mathematics 710. 3 + 3 q.h.

910, 911. *Quantum Mechanics I, II*. Quantum phenomena in relation to classical physics. Schrodinger and Heisenberg picture; angular momentum and scattering theory. Hamiltonian theory of a particle in an electromagnetic field. Pauli principle; identical particles. Prereq.: Physics 702, 822, 705, and Mathematics 711. 3 + 3 q.h.

915, 916. *Space Science*. Geophysics; physics of the Earth's atmosphere and other planets. Physics of the sun and the solar system. Advances in the International Geophysical Year, 1957-1958; problems of man in space. Prereq.: Physics 510, 601, and Mathematics 710, 711. 3 + 3 q.h.

920, 921. *Electromagnetic Theory*. Electromagnetic fields in a vacuum; microscopic and macroscopic fields. Methods for calculation of potential problems. Maxwell's equations in the presence of metallic boundaries. Radiation from an accelerated charge. Lienard-Wiechert potentials. Prereq.: Physics 822 and Mathematics 711. 3 + 3 q.h.

930, 931. *Solid State Physics I, II*. The physics of solid state phenomena including crystal structure, diffraction, crystal binding, lattice vibrations and thermal properties of solids, theory of metals and semiconductors, superconductivity, dielectric properties of solids, magnetism, and imperfections in solids. Prereq.: Physics 810 or equivalent background. Physics 930 is prereq. to 931. 3 + 3 q.h.

POLITICAL SCIENCE

Ivis Boyer, *Chairman of the Department*

YOUNGSTOWN STATE UNIVERSITY

109 Arts and Sciences Office Building

- 800. Select Problems, American Government. (3 q.h.)
- 840. Select Problems, Comparative Government. (3 q.h.)
- 860. Select Problems, International Relations. (3 q.h.)
- 880. Select Problems, Political Theory. (3 q.h.)

PSYCHOLOGY

Sanford Hotchkiss, *Chairman of the Department*

219 Kilcawley Men's Residence

- 802. Personality. (4 q.h.)
- 805. Interviewing Techniques. (4 q.h.)
- 806. Vocational Guidance. (4 q.h.)
- 807. Introduction to Counseling. (4 q.h.)
- 828. Physiological Psychology. (4 q.h.)
- 836. Psychology of the Exceptional Child: (General). (3 q.h.)
- 837. Psychology of the Exceptional Child: (Retarded). (3 q.h.)
- 838. Psychology of the Exceptional Child: (Gifted). (3 q.h.)
- 903. *The Psychology of Learning*. Examination of experimentally-determined facts concerning the learning process and their implication for use in school. 3 q.h.
- 906. *Human Growth and Development*. Expanded aspects of child and adolescent psychology. 3 q.h.
- 907. *Psychology of Adjustment*. Basic problems dealing with mental health, individual differences, motivation, and minor deviant behavior. 3 q.h.
- 980. *Psychological Aspects of Mentally Retarded Children*. An intensive study of psychology and educational psychology in mental retardation; exploration and discussion of paradigm in child psychology, developmental psychology, and personality. 3 q.h.
- 981. *Advanced Seminar in Mental Retardation*. (Sp. Ed. 981) Exploration of general research and other theoretical studies concerning the mentally retarded, with particular emphasis on psychological variables in learning. 3 q.h.

SECONDARY EDUCATION

Louis E. Hill, *Chairman of the Department*

215D School of Education

- 850. Reading Problems in the Secondary School. (3 q.h.)
- 891, 892, 893. Seminar in Secondary Education. (1 - 4 q.h.)
- 910. *Supervision of Practice Teachers—Secondary*. Basic counseling and supervisory techniques associated with the acceptance of responsibility for inducting the teaching neophyte into his first truly professional experiences. Actual work with student teachers. 3 q.h.

COURSES

931. *The Secondary School Curriculum.* Historical development of the American secondary school curriculum, present nature, and recent developments. Study of reports, experiments, and typical programs. The roles of supervisors, administrators, teachers, pupils, and public in the development of curriculums. 3 q.h.

946. *The Supervision of Instruction.* (El. Ed. 946) A course dealing with the supervision of instruction and organization of a school designed for those aspiring to be principals or supervisors. Decision making, supervision, observation of supervisory experiences, direction in educational technology, the various subjects, staff relationships, school organization, pupil personnel, and extra-curricular activities are among the areas considered with emphasis upon elementary or secondary situations as appropriate. 3 q.h.

948. *Basic Principles of Secondary School Administration.* The role of the secondary school principal in general administrative techniques. 3 q.h.

949. *School Law.* Principles of constitutional, statutory, case, and common law affecting Ohio schools as they apply to the political subdivision of the school district and the administrative, line, and staff personnel; legal provisions and principles relating to education at all levels. 3 q.h.

950. *School Business Management.* The principal's responsibility for school management problems including activity fund accounting, purchasing, budgeting, building maintenance, pupil insurance and related areas. 3 q.h.

951. *Communications and the School Principal.* Techniques of communicating effectively with teachers, administrators, non-teaching personnel, pupils, and parents. Organizing the overall communications program within a school. Related problems. 3 q.h.

952. *School Finance.* A study of the fiscal setting of public school finance in the United States, with particular emphasis on the State of Ohio. It will analyze systematic approaches to local, state and federal financing of schools, including accounting, budgeting, purchasing, and funding for the operation of public schools. 3 q.h.

953. *Practicum in Administration for School Principals.* 3 q.h.

954. *School Community Relations.* A course designed to develop competency in the techniques of planning, administering and evaluating effective programs of school-community relations. 3 q.h.

955. *Staff Personnel Administration.* Policies and practices of personnel administration. Recruitment, selection, assignment, and supervision of teaching and non-teaching personnel. Salary schedules and other employee rewards. Policies for career development. Handling of grievances and negotiations. 3 q.h.

956. *Educational Facilities.* A course designed to familiarize the prospective administrator with the problems of new plant development and maintenance remodeling, rehabilitation of current plants, and the selection and maintenance of equipment. 3 q.h.

YOUNGSTOWN STATE UNIVERSITY

SOCIOLOGY AND ANTHROPOLOGY

James W. Kiriazis, *Chairman of the Department*

603 Lincoln Project

900. *Special Sociological Problems.* Advanced seminars focusing on independent study at the graduate level: Social Organization in a Changing World; Social Disorganization (or Deviance) and Social Controls; Social and Cultural Factors in Personality Development; Minority Relationships; Sociology of Law; Social Change; Comparative Institutions. each 4 q.h.

901. *Social Case Work for School Guidance Personnel.* The field of social work. Emphasis will be on major institutions of social work important to school guidance personnel and on the values and method of social case-work. Specific topics include the use of relationship, social diagnosis, social work treatment, and social work advocacy. Major institutions surveyed are the juvenile court, mental health agencies and family and children's agencies. 3 q.h.

910. *Special Anthropological Problems.* Advanced seminars focusing on independent study at the graduate level: Archaeology, Its Methods and Functions; Human Origins and Differentiation; Anthropology of Religion; Cultural Change and Its Impact. each 4 q.h.

SPECIAL EDUCATION

M. Dean Hoops, *Chairman of the Department*

Lincoln Project

851. Principles and Practices in Curriculum Planning and Development for Slow Learners: Social Studies. (3 q.h.)

852. Principles and Practices in Curriculum Planning and Development for Slow Learners: Language Arts. (3 q.h.)

853. Principles and Practices in Curriculum Planning and Development for Slow Learners: Arithmetic. (3 q.h.)

854. Preparation, Selection and Adaptation of Instructional Materials for Slow Learners. (3 q.h.)

855. Occupational Orientation and Job Training for Slow Learners. (3 q.h.)

976. *Problems and Issues in Mental Retardation.* A forum for presenting positions relative to the recurring philosophical, sociological, and political issues in mental retardation. 3 q.h.

977. *Research and Problems in the Education of the Mentally Retarded.* Consideration of problems concerning practices in the education of the mentally retarded and the examination of pertinent psychological, educational, medical, and other relevant research in the determination of trends and practices regarding the mentally retarded. 3 q.h.

978. *Supervision of Special Education.* Consideration of the estab-

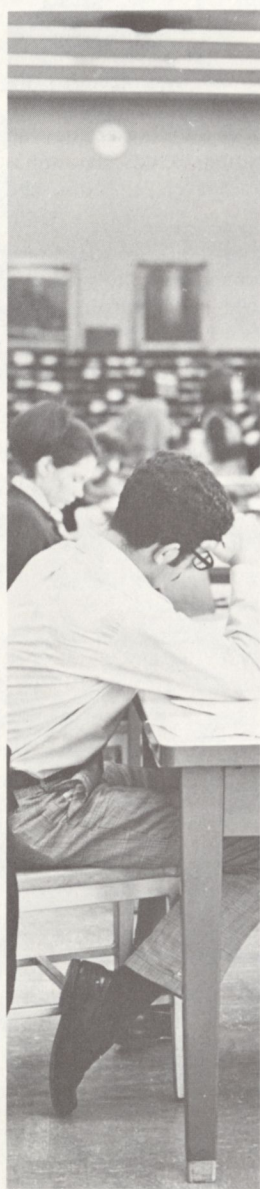
COURSES

lishment and function of educational programs for the mentally retarded and the programs' relationship to the total educative process for teachers and supervisors in special education. 3 q.h.

979. *The Mentally Retarded in Society.* Especially organized to inform students of the services provided across the nation, within the states and locally. Guest speakers from agencies, private and public, serving the Retarded Act as informants and catalysts regarding unmet needs. Examination of federal, state, and community planning and research affecting the mentally retarded. 3 q.h.

981. *Advanced Seminar in Mental Retardation.* (Psych. 981) Exploration of general research and other theoretical studies concerning the mentally retarded, with particular emphasis on psychological variables in learning. 3 q.h.

982. *Administration of Special Education Programs.* An overview of the areas usually administered by a Director of Special Education including development of special education programs, present scope and status of special education, finance, curriculum development, staff recruitments, public relations, legislations, etc. Prereq.: Ed. 732 and Ed. 833. 3 q.h.



Graduate Faculty

Administrative Members

Albert L. Pugsley, Sc.D., LL.D.	President
Earl E. Edgar, Ph.D.	Vice President for Academic Affairs
John J. Coffelt, Ed.D.	Vice President for Administrative Affairs
James A. Scriven, Ed.D.	Dean of Admissions and Records
Charles H. Aurand, Jr., Ph.D.	Dean of the Dana School of Music
M. Jean Charignon, Ph.D., P.E.	Dean of the William Rayen School of Engineering
Bernard J. Yozwiak, Ph.D.	Dean of the College of Arts and Sciences
Karl E. Krill, Ph.D., P.E.	Dean of the Graduate School
Robert L. Miller, M.B.A.	Dean of the School of Business Administration
Nicholas Paraska, Ph.D., P.E.	Dean of the Technical and Community College
Donald W. Robinson, Ph.D.	Dean of the School of Education

Senior Members

Domenico B. Aliberti, Associate Professor of Foreign Languages: *Maturita Classica* (Bachelor), Liceo "L. Valli", Barcellone PG (Italy), 1950; D. Litt., University of Messina, Italy, 1959.

Lorraine Y. Baird, Assistant Professor of English: A.B., Catawba College, 1951; M.A., Appalachian State College, 1959; Ph.D., University of Kentucky, 1969.

Peter A. Baldino, Jr., Associate Professor of Education: B.S., University of Bridgeport, 1955; M.S., University of Bridgeport, 1956; Ph.D., University of Illinois, 1968.

David M. Behen, Professor of History: Ph.B., University of Chicago, 1932; Ph.D., University of Chicago, 1953.

Paul X. Bellini, Assistant Professor of Civil Engineering: B.S., University of Massachusetts, 1962; M.S., University of Massachusetts, 1964; Ph.D., University of Massachusetts, 1968.

Frederick J. Blue, Associate Professor of History: B.A., Yale University, 1958; M.S., University of Wisconsin, 1962; Ph.D., University of Wisconsin, 1966.

Irwin Cohen, Professor of Chemistry: A.B., Western Reserve University, 1944; M.S., Western Reserve University, 1948; Ph.D., Western Reserve University, 1950.

YOUNGSTOWN STATE UNIVERSITY

Sister Mary Conroy, Assistant Professor of English: B.S. in Ed., Youngstown State University, 1956; M.A., Marquette University, 1963; Ph.D., University of Notre Dame, 1968.

Ralph G. Crum, Associate Professor of Civil Engineering: B.S., Carnegie Institute of Technology, 1953; M.S., Carnegie Institute of Technology, 1954; Ph.D., Carnegie Institute of Technology, 1956.

Arthur Ranger Curran, Associate Professor of Management: B.S., Boston University, 1948; M.B.A., Air Force Institute of Technology, 1959; Ph.D., Georgia University, 1970.

Paul E. Dalbec, Associate Professor of Physics and Astronomy: B.S., Boston College, 1957; M.S., University of Notre Dame, 1959; Ph.D., Georgetown University, 1966.

Theodosius L. Demen, Associate Professor of Mathematics: University of Innsbruck, Austria, 1948-51; M.S., Marquette University, 1954; Ph.D., St. Louis University, 1958.

Thaddeus M. Dillon, Professor of Mathematics: B.S., John Carroll University, 1950; M.S., John Carroll University, 1952; Ph.D., University of Pittsburgh, 1963.

Lawrence DiRusso, Associate Professor of Education: A.B., Youngstown State University, 1954; M.A., Kent State University, 1960; Ed.D., Western Reserve University, 1966.

Thomas N. Dobbstein, Assistant Professor of Chemistry: B.S., Eastern Michigan University, 1964; M.S., Iowa State University, 1966; Ph.D., Iowa State University, 1967.

G.A. Dobbert, Associate Professor of Sociology and Anthropology: M.A., University of Chicago, 1957; Ph.D., University of Chicago, 1965.

Leslie S. Domonkos, Associate Professor of History: A.B., Youngstown State University, 1959; M.A., University of Notre Dame, 1960; M.M.S., University of Notre Dame, 1963; D.S.M., University of Notre Dame, 1966.

Paul Richard Ducey, Associate Professor of Sociology and Anthropology: A.B., Columbia University, 1950; Ph.D., Columbia University, 1956.

Hugh G. Earnhart, Assistant Professor of History: A.B., Bowling Green State University, 1960; M.A., University of Maryland, 1963.

Dale W. Fishbeck, Assistant Professor of Biology: B.A., Yankton College, 1957; M.A., University of South Dakota, 1959; Ph.D., University of Minnesota, 1968.

Elmer Foldvary, Associate Professor of Chemistry: B.S., Youngstown State University, 1958; M.S., Texas A. and M. University, 1961; Ph.D., Texas A. and M. University, 1964.

Randolph N. Foster, Jr., Director of Institutional Research: B.M., Uni-

GRADUATE FACULTY

versity of Texas, 1942; M.M., University of Texas, 1947; Ed.D., George Peabody College for Teachers, 1959.

Saul S. Friedman, Assistant Professor of History: B.A., Kent State University, 1959; M.A., Ohio State University, 1962; Ph.D., Ohio State University, 1969.

Charles G. Gebelein, Associate Professor of Chemistry: B.A., Temple University, 1955; M.A., Temple University, 1959; Ph.D., Temple University, 1967.

Ronald L. Gould, Associate Professor of Music: B.M., North Central College, 1954; S.M.M., Union Theological Seminary, 1956; S.M.D., Union Theological Seminary, 1970.

Martin A. Greenman, Professor of Philosophy and Religious Studies: B.A., University of Chicago, 1942; Ph.D., University of Chicago, 1950.

Philip J. Hahn, Professor of Economics: B.S., Juniata College, 1938; M.B.A., Harvard Graduate School of Business Administration, 1940; Ph.D., Case Western Reserve University, 1965.

Clyde T. Hankey, Professor of English: B.A., University of Pittsburgh, 1949; M.A., University of Pittsburgh, 1950, University of Michigan, 1954; Ph.D., University of Michigan, 1960.

Stephen Hanzely, Assistant Professor of Physics and Astronomy: B.S., Kent State University, 1962; M.S., Toledo University, 1964; M.S., New Mexico State University, 1967; Ph.D., New Mexico State University, 1968.

Mary V. Hare, Associate Professor of English: A.B., Mount Holyoke College, 1940; M.A., University of Virginia, 1951; Ph.D., University of Virginia, 1960.

Robert R. Hare, Associate Professor of English: B.A., Ohio State University, 1936; M.A., University of Delaware, 1957; Ph.D., University of Maryland, 1967.

Martin Helling, Assistant Professor of Mathematics: B.Sc., Ohio State University, 1956; M.Sc., University of Chicago, 1958; Ph.D., University of California at Berkeley, 1966.

Joel E. Henkel, Assistant Professor of Physics and Astronomy: A.B., Princeton University, 1952; M.S., University of New Hampshire, 1958, Yale University, 1961; Ph.D., University of New Hampshire, 1965.

Russell C. Hibbeler, Assistant Professor of Civil Engineering: B.S. in C.Eng., University of Illinois, 1965; M.S. in Nuc. Eng., University of Illinois, 1966; Ph.D. in T.A.M., Northwestern University, 1968.

Louis E. Hill, Associate Professor of Education: B.S., State University of New York at Oswego, 1950; M.S., Syracuse University, 1953; Ed.D., Syracuse University, 1969.

Robert Elliott Hopkins, Associate Professor of Music: B.M., Eastman

YOUNGSTOWN STATE UNIVERSITY

School of Music of the University of Rochester, 1953; M.M., Eastman School of Music, 1954; D.M.A., Eastman School of Music, 1959.

Sanford N. Hotchkiss, Professor of Psychology: B.A., University of Minnesota, 1949; M.A., University of Minnesota, 1950; Ph.D., University of Minnesota, 1959.

Michael K. Householder, Associate Professor of Civil Engineering: B.S., Valparaiso University, 1963; M.S., Purdue University, 1965; Ph.D., Purdue University, 1968.

Donald Eugene Hovey, Professor of Management: B.A., University of California at Los Angeles, 1950; M.A., University of Colorado, 1958; Ph.D., University of Colorado, 1962.

Pei Huang, Associate Professor of History: B.A., National Taiwan University, 1956; M.A., National Taiwan University, 1959; Ph.D., Indiana University, 1963.

Raymond W. Hurd, Associate Professor of Mathematics: B.S.Ed., Ohio University, 1951; M.Ed., Ohio University, 1957; Ph.D., Ohio State University, 1967.

Ronald W. Jonas, Associate Professor of Mathematics, Director of the Computer Center: B.A., The University of Texas, 1958; Ph.D., The University of Texas, 1968.

George H.G. Jones, Assistant Professor and Librarian: A.B., Oberlin College, 1931; M.L.S., Kent State University, 1957; Ph.D., Harvard University, 1966.

Richard W. Jones, Assistant Professor of Metallurgical Engineering and Materials Science: B.S., University of Missouri at Rolla, 1959; M.S., Rensselaer Polytechnic Institute, 1963; Ph.D., Northwestern University, 1968.

James G. Karas, Associate Professor of Biology: B.S., University of Illinois, 1956; M.S., Michigan State University, 1958; Ph.D., Michigan State University, 1962.

John L. Kearns, Associate Professor of Industrial Engineering: B.A., University of Toronto, 1945; Ph.D., Iowa State University, 1954.

Jean McClure Kely, Associate Professor of English: A.B., Youngstown University, 1958; M.A., Western Reserve University, 1959; Ph.D., Case Western Reserve University, 1969.

Taghi T. Kermani, Professor of Economics: LL.B., University of Tehran, 1949; M.A., University of Nebraska, 1953; Ph.D., University of Nebraska, 1959.

James W. Kiriazis, Associate Professor of Sociology and Anthropology: A.B., Youngstown State University, 1951; M.S.W., Louisiana State University, 1953; Ph.D., University of Pittsburgh, 1967.

GRADUATE FACULTY

Joseph Kirschner, Associate Professor of Education: B.S., Tulane University, 1953; M.A.T., Tulane University, 1960; Ed.D., Rutgers, The State University, 1965.

Mervin Kohn, Associate Professor of Management: A.B., University of Missouri, 1937; M.S. in C., St. Louis University, 1953; Ph.D., St. Louis University, 1957.

Friedrich W. Koknat, Assistant Professor of Chemistry: B.S., Justus Liebig University, 1959; M.S., Justus Liebig University, 1963; Ph.D., Justus Liebig University, 1965.

T.R. Rama Krishnan, Associate Professor of Management: B.A., Panjab University (India), 1958; B.S. in B.A., The American University, 1964; M.B.A., The American University, 1965; Ph.D., The American University, 1967.

George E. Letchworth, Assistant Professor of Psychology: A.B., Bucknell University, 1956; A.M., University of Pennsylvania, 1958; Ph.D., University of Pennsylvania, 1963.

Charles M. Lovas, Assistant Professor of Mechanical Engineering: B.S.M.E., University of Akron, 1961; M.S.M.E., University of Notre Dame, 1963; Ph.D., University of Notre Dame, 1968.

Joseph R. Lucas, Associate Professor of Philosophy and Religious Studies: A.B., University of Scranton, 1938; M.A., S.T.B., S.T.L., University of Ottawa, 1943-7; M.A., Kent State University, 1950; J.C.B., J.C.L., J.C.D., Lateran University, Rome, 1958-62; J.D., Youngstown State University, 1957; S.T.D., Angelicum University of Rome, 1952; Ph.D., University of Ottawa, 1951.

Marvin Lukin, Assistant Professor of Chemistry: B.S., Ohio University, 1949; M.S., Case Western Reserve University, 1954; Ph.D., Case Western Reserve University, 1956.

David B. MacLean, Assistant Professor of Biology: B.S., Heidelberg College, 1963; M.S., Purdue University, 1965; Ph.D., Purdue University, 1968.

Inally Mahadeviah, Associate Professor of Chemistry: B.Sc. (Hons), University of Mysore, 1950; M.Sc., University of Mysore, 1954; Ph.D., University of Cincinnati, 1963.

Joseph Melville Marshall, Associate Professor of Health and Physical Education: B.S., Springfield College, 1953; M.Ed., Springfield College, 1955; Ph.D., University of Minnesota, 1970.

Donald E. McLennan, Professor of Physics and Astronomy: B.A., University of Western Ontario, 1941; M.A., University of Toronto, 1948; Ph.D., University of Toronto, 1950.

Howard D. Mettee, Assistant Professor of Chemistry: B.A., Middlebury College, 1961; Ph.D., University of Calgary, 1964.

Thelma S. Miner, Professor of English: B.A., Dickinson College, 1935; M.A., University of Pennsylvania, 1942; Ph.D., University of Pennsylvania, 1945.

YOUNGSTOWN STATE UNIVERSITY

Ward L. Miner, Professor of English: B.A., University of Colorado, 1938; M.A., University of Chicago, 1940; Ph.D., University of Pennsylvania, 1951.

William D. Moorhead, Jr., Assistant Professor of Physics and Astronomy: B.A., Ohio Wesleyan University, 1958; Ph.D., Ohio State University, 1968.

Jon M. Naberezny, Professor of Art: B.S. in Ed., Youngstown State University, 1949; M.A., State University of Iowa, 1952.

Edwin R. Pejack, Associate Professor of Mechanical Engineering: B.M.E., Rensselaer Polytechnic Institute, 1961; M.S., Rensselaer Polytechnic Institute, 1962; Ph.D., Ohio State University, 1967.

Paul C. Peterson, Associate Professor of Biology: B.S., Gustavus Adolphus College, 1962; Ph.D., University of Nebraska, 1968.

Joan A. Philipp, Associate Professor of Health and Physical Education: B.S., Western Michigan University, 1952; M. of P.E., Macmurray College, 1953; Ph.D., University of Michigan, 1967.

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James A. Reeder, Assistant Professor of Chemistry: B.S., University of Kansas, 1954; Ph.D., University of Colorado, 1959.

Charles Lloyd Reid, Associate Professor of Philosophy and Religious Studies: B.A., Bethel College, 1951; M.A., Duke University, 1954; Ph.D., Duke University, 1960.

Victor A. Richley, Professor of Electrical Engineering and Chairman of Engineering Technology: B.E., Youngstown State University, 1956; M.S.E.E., University of Akron, 1961; Ph.D., University of Pittsburgh, 1967; P.E.

Bruce T. Riley, Associate Professor of Philosophy and Religious Studies: A.B., Cornell College (Iowa), 1929; S.T.B., Boston University School of Theology, 1932; Ph.D., Boston University, 1940.

Lewis B. Ringer, Associate Professor of Health and Physical Education: B.S., Springfield College, 1956; M.S., West Virginia University, 1962; D.P.E., Springfield College, 1966.

Sidney I. Roberts, Professor of History: B.S.Ed., The City College of New York, 1952; M.A., Columbia University, 1953; Ph.D., Northwestern University, 1960.

Donald W. Robinson, Professor of Education: B.A., Carthage College, 1950; M.A., Bradley University, 1951; Ph.D., Bradley University, 1957.

Lewis S. Rosenthal, Assistant Professor of English: B.A., Colgate University, 1949; M.A., Auburn University, 1954; Ph.D., Louisiana State University, 1968.

Duane Sample, Associate Professor of Music: B.F.A., Carnegie-Mellon

GRADUATE FACULTY

University, 1950; M.Ed., University of Pittsburgh, 1953; Ed.D., Columbia University, 1964.

Eugene S. Santos, Associate Professor of Mathematics: B.S.M.E., Mapua Institute of Technology, 1961; M.Sc., University of the Philippines, 1963; Ph.D., The Ohio State University, 1965.

Lowell J. Satre, Assistant Professor of History: B.A., Augustana College, 1964; M.A., Ph.D., University of South Carolina, 1968.

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George H. Schoenhard, Associate Professor of Education: A.B., Youngstown State University, 1936; Litt.M., University of Pittsburgh, 1939; Ed.D., University of Pittsburgh, 1957.

Lauren Schroeder, Associate Professor of Biology: B.S., St. Cloud State College, 1960; M.A., University of South Dakota, 1964; Ph.D., University of South Dakota, 1968.

Robert H. Secrist, Associate Professor of English: A.B., Harvard University, 1957; M.A., New York University, 1959; Ph.D., New York University, 1965.

Matthew Siman, Associate Professor of Electrical Engineering: B.S. in E.E., Case Institute of Technology, 1949; M.S. in E.E., Case Institute of Technology, 1956; Ph.D., University of Pittsburgh, 1970.

Alvin W. Skardon, Jr., Professor of History: A.B., College of Charleston, 1933; M.A., University of Chicago, 1947; Ph.D., University of Chicago, 1960.

Morris Slavin, Professor of History: B.S. in Ed., Ohio State University, 1938; M.A., University of Pittsburgh, 1952; Ph.D., Western Reserve University, 1961.

Charles L. Smith, Associate Professor of Education: B.S., University of Louisville, 1947; M.A., Ohio State University, 1950; Ed.D., Case Western Reserve University, 1968.

Francis W. Smith, Associate Professor of Chemistry: B.Sc., University of Capetown, 1952; B.Sc., Honours, University of Capetown, 1954; Ph.D., University of Capetown, 1967.

Robert K. Smith, Associate Professor of Chemistry: B.S., University of Massachusetts, 1950; M.S., University of Massachusetts, 1950; Ph.D., University of Wyoming, 1966.

Anthony E. Sobota, Associate Professor of Biology: B.S.Ed., Indiana University of Pa., 1960; M.S., University of Pittsburgh, 1963; Ph.D., University of Pittsburgh, 1966.

Marilyn Solak, Associate Professor of Education: A.B., Mount Union

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College, 1947; M.Ed., Kent State University, 1950; Ed.D., Case Western Reserve University, 1963.

Joseph Solimine, Jr., Associate Professor of English: B.A., Brown University, 1956; M.A., University of Rhode Island, 1959; Ph.D., University of Pennsylvania, 1964.

Leonard B. Spiegel, Associate Professor of Chemistry: B.A., New York University, 1950; M.S., Florida State University, 1954; Ph.D., Florida State University, 1963.

Arthur G. Spiro, Associate Professor of Music: B.A., University of Minnesota, 1951; M.A., University of Minnesota, 1953; Ph.D., Boston University, 1961.

Elizabeth Sterenberg, Professor of Political Science: A.B., Knox College, 1929; A.M., Radcliffe College, 1932; Ph.D., University of Chicago, 1963.

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