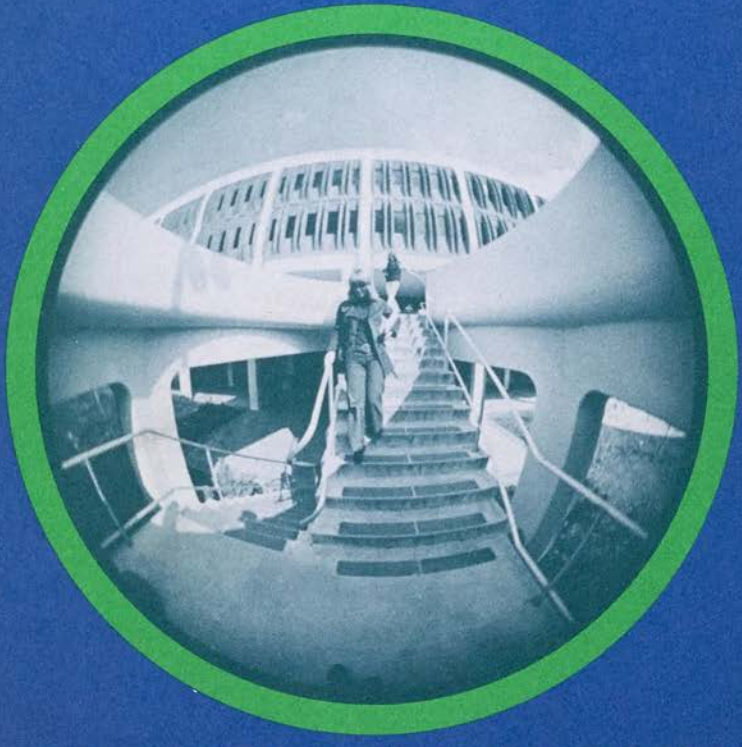
the california state university and colleges

CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA



1973-74 GRADUATE BULLETIN

STUDENT RESPONSIBILITY

All members of the college faculty and staff have a primary mission of helping students in every way possible. We will do everything we can to make your progress toward a degree or a credential as rapid and as successful as possible. This assistance will help you meet necessary requirements, but *each student is individually responsible for meeting all requirements and deadlines,* academic and administrative, as presented in this bulletin or in other publications and announcements of the Graduate Division or the school and department in which you are enrolled.

CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

1973-74 GRADUATE BULLETIN

FOREWORD

The Graduate Bulletin is published to provide information to prospective and continuing post-baccalaureate students. It serves as a handbook to students working toward master's degrees and credentials and contains all information essential to enrollment in the university for graduate study and progress toward post-baccalaureate objectives available at the university. Included are descriptions of programs leading to master's degrees and authorized by the Trustees of the California State University and Colleges and to credentials authorized by the Trustees and the California State Board of Education.

The reader who seeks further information or assistance regarding master's degrees or teaching credentials is invited to visit the Office of the Graduate Division, the Teacher Preparation Center, or the appropriate departmental or school office.

For general information about the university, descriptions of undergraduate curricula and courses, and information regarding facilities and special programs, see the university catalog which may be purchased from the bookstore for $1.40, postpaid.

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ACADEMIC CALENDAR 1973–74 *

Schedule	Summer Quarter 1973	Fall Quarter 1973	Winter Quarter 1974	Spring Quarter 1974
Application for admission accepted beginning		November 1, 1973**	June 1, 1973 June 3, 1974***	August 1, 1973
Classes begin for all students	July 12	September 20	January 2	April 21
Last day to withdraw from classes without penalty	July 9	September 26	January 8	April 5
Last day to add classes or register late	July 12	October 1	January 11	April 10
Last day to withdraw from classes and receive refund	July 16	October 4	January 16	April 15
Last day to apply for current quarter graduation	July 27	October 19	January 25	April 19
Current student deadline for next quarter scheduling	August 10	November 8	February 14	Summer: May 22 Fall: May 23
Withdrawal from classes after this date permitted only in emergency clearly beyond student's control	August 13	November 9	February 22	May 17
Last day to apply for graduate admission to next quarter	August 10	November 16	February 15	May 10
Last day to submit approved master's thesis or project and last day for notification of completion of comprehensive examination	August 21	November 26	March 11	June 3
Final Examinations	August 29-31	December 3-7	March 18-22	June 10-14
Commencement				June 15

ACADEMIC HOLIDAYS				
Independence Day	July 4			
Columbus Day		October 8		
Veterans' Day		October 22		
Thanksgiving		November 22-23		
Christmas		December 10-January 1		
Lincoln's Birthday			February 12	
Washington's Birthday			February 18	
Memorial Day				May 27

*See *Catalog* and *Summer Session Bulletin* for additional scheduled dates.
**For Fall Quarter 1974.
***For Winter Quarter 1975.

CALENDAR 1973

JULY

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CALENDAR 1974

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JUNE

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THE CALIFORNIA STATE UNIVERSITY AND COLLEGES

Glenn S. Dumke, *Chancellor*

The individual California State Colleges were brought together as a system by the Donahoe Higher Education Act of 1960. In 1972 the system became The California State University and Colleges and fourteen of the nineteen campuses received the title *University*.

The oldest campus—California State University, San Jose—was founded in 1857 and became the first institution of public higher education in California. The newest campus—California State College, Bakersfield—began instruction in 1970.

Responsibility for The California State University and Colleges is vested in the Board of Trustees, whose members are appointed by the Governor. The Trustees appoint the Chancellor, who is the chief executive officer of the system, and the Presidents, who are the chief executive officers on the respective campuses.

The Trustees, the Chancellor, and the Presidents develop systemwide policy, with actual implementation at the campus level taking place through broadly based consultative procedures. The Academic Senate of The California State University and Colleges, made up of elected representatives of the faculty from each campus, recommends academic policy to the Board of Trustees through the Chancellor.

Academic excellence has been achieved by The California State University and Colleges through a distinguished faculty, whose primary responsibility is superior teaching. While each campus in the system has its own unique geographic and curricular character, all campuses, as multipurpose institutions, offer undergraduate and graduate instruction for professional and occupational goals as well as broad liberal education. All of the campuses require for graduation a basic program of "General Education-Breadth Requirements" regardless of the type of bachelor's degree or major field selected by the student. A limited number of doctoral degrees is offered jointly with the University of California.

Presently, under the system's "New Approach to Higher Education," the campuses are implementing a wide variety of innovative programs to meet the changing needs of students and society. Among pilot programs under way are off-campus degree programs, weekend colleges, self-paced learning programs, and special testing programs to accelerate student progress toward a degree.

Enrollments in fall 1972 totaled 278,000 students, who were taught by a faculty of 15,500. Last year the system awarded over 55 percent of the bachelor's degrees and 35 percent of the master's degrees granted in California. Almost 360,000 persons have been graduated from the nineteen campuses since 1960.

Trustees of the California State University and Colleges

EX OFFICO TRUSTEES

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President of the Trustees
State Capitol, Sacramento 95814

HON. ED REINECKE
Lieutenant Governor of California
State Capitol, Sacramento 95814

HON. BOB MORETTI
Speaker of the Assembly
State Capitol, Sacramento 95814

HON. WILSON C. RILES
Superintendent of Public Instruction
721 Capitol Mall, Sacramento 95814

DR. GLENN S. DUMKE
Chancellor of the California State University and Colleges
5670 Wilshire Boulevard,
Los Angeles 90036

APPOINTED TRUSTEES

Appointments are for a term of eight years expiring March 1 of the years in parentheses. Names are listed in order of appointment to the Board.

CHARLES LUCKMAN (1974)
9220 Sunset Boulevard
Los Angeles 90069

DANIEL H. RIDDER (1975)
604 Pine Ave.
Long Beach 90801

GEORGE D. HART (1975)
111 Sutter Street
San Francisco 94104

ALEC L. CORY (1973)
530 B Street, Suite 1900
San Diego 92101

EDWARD O. LEE (1974)
2000 Center Street
Berkeley 94704

KARL L. WENTE (1976)
5565 Tesla Road
Livermore 94550

W. O. WEISSICH (1977)
1299 4th Street
San Rafael 94901

ROBERT A. HORNBY (1978)
P.O. Box 60043, Terminal Annex
Los Angeles 90060

WENDELL W. WITTER (1979)
45 Montgomery St.
San Francisco 94106

MRS. WINIFRED H. LANCASTER (1977)
P.O. Drawer JJ
Santa Barbara 93102

GENE M. BENEDETTI (1978)
8990 Poplar Ave.
Cotati 94952

ROBERT F. BEAVER (1976)
254 East 27th St.
Los Angeles 90011

ROY T. BROPHY (1980)
2160 Royale Rd., Suite 20
Sacramento 95815

MRS. C. STEWART RITCHIE (1980)
1064 Creek Dr.
Menlo Park 94025

FRANK P. ADAMS (1973)
235 Montgomery St.
San Francisco 94104

RICHARD A. GARCIA (1979)
P.O. Box 2073
Glendale 91209

OFFICERS OF THE TRUSTEES

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Governor Ronald Reagan

Chairman
Karl L. Wente

Vice-Chairman
George D. Hart

Secretary-Treasurer
Chancellor Glenn S. Dumke

OFFICE OF THE CHANCELLOR
THE CALIFORNIA STATE UNIVERSITY AND COLLEGES

5670 Wilshire Boulevard, Los Angeles 90036
213 938-2981

Chancellor
Glenn S. Dumke

Executive Vice Chancellor
H. E. Brakebill

Vice Chancellor and General Counsel
Normal L. Epstein

Vice Chancellor, Business Affairs
D. Dale Hanner

Vice Chancellor, Physical Planning and Development
Harry Harmon

Assistant Chancellor, Faculty and Staff Affairs
C. Mansel Keene

Vice Chancellor, Academic Affairs
William B. Langsdorf

THE CALIFORNIA STATE UNIVERSITY AND COLLEGES

California State College, Bakersfield
9001 Stockdale Highway
Bakersfield, California 93309
Paul F. Romberg, *President*
805 833-2011

California State College, Dominguez Hills
1000 East Victoria Street
Dominguez Hills, California 90247
Leo F. Cain, *President*
213 532-4300

California State University, Fullerton
Fullerton, California 92634
L. Donald Shields, *President*
714 870-2011

California State University, Hayward
25800 Hillary Street
Hayward, California 94542
Ellis E. McCune, *President*
415 884-3000

California State University, Long Beach
6101 East Seventh Street
Long Beach, California 90804
Stephen Horn, *President*
213 498-4111

California State University, Los Angeles
5151 State University Drive
Los Angeles, California 90032
John A. Greenlee, *President*
213 224-0111

California State College, San Bernardino
5500 State College Parkway
San Bernardino, California 92407
John M. Pfau, *President*
714 887-6311

California State Polytechic University, Pomona
3801 West Temple Avenue
Pomona, California 91768
Robert C. Kramer, *President*
714 598-4141

California Polytechic State University, San Luis Obispo
San Luis Obispo, California 93401
Robert E. Kennedy, *President*
805 546-0111

California State University, Chico
First and Normal Streets
Chico, California 95926
Stanford Cazier, *President*
916 345-5011

California State University, Fresno
Shaw and Cedar Avenues
Fresno, California 93710
Norman A. Baxter, *President*
209 487-9011

California State University, Humboldt
Arcata, California 95521
Cornelius H. Siemens, *President*
707 826-3011

California State University, Northridge
18111 Nordhoff Street
Northridge, California 91324
James W. Cleary, *President*
213 885-1200

California State University, Sacramento
6000 J Street
Sacramento, California 95819
James Bond, *President*
916 454-6011

California State University, San Diego
5402 College Avenue
San Diego, California 92115
Brage Golding, *President*
714 286-5000

Imperial Valley Campus
720 Heber Avenue
Calexico, California 92231
714 357-3721

California State University,
San Francisco
1600 Holloway Avenue
San Francisco, California 94132
S. I. Hayakawa, *President*
415 469-9123

California State University, San Jose
125 South Seventh Street
San Jose, California 95114
John H. Bunzel, *President*
408 277-2000

California State College, Sonoma
1801 East Cotati Avenue
Rohnert Park, California 94928
Thomas H. McGrath, *President*
707 795-2011

California State College, Stanislaus
800 Monte Vista Avenue
Turlock, California 95380
Carl Gatlin, *President*
209 634-9101

CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

Robert C. Kramer, *President*

In historical development, methods of education, and dedication to professional and occupationally-centered curricula the California State Polytechnic University, Pomona has a distinctive identity among universities and colleges in California.

As one of the 19 members of the state university and college system, it offers educational programs in agriculture, arts, business, engineering, environmental design, science and the preparation of elementary and secondary teachers.

Cal Poly's graduate programs continue the college's emphasis upon instruction which is specific and practical. Faculty members are selected on the basis of academic qualifications, professional experience, and teaching ability. Graduate instruction emphasizes individualized programming, independent study, and searching and deep analysis of significant problems. Beyond practical application, graduate students exhibit a high level of scholarship and critical insight.

HISTORICAL DEVELOPMENT

The university was established in 1901 at San Luis Obispo. The Cal Poly program was extended to Southern California in 1938, when the 157-acre Voorhis School for Boys near San Dimas was deeded to the state by Charles B. Voorhis of Pasadena, and his son, former Congressman Jerry Voorhis.

The Kellogg site, originally developed by W. K. Kellogg as an Arabian Horse Ranch in 1925, was given to the State of California in 1949 for use by the then California State Polytechnic College. Academic instruction began on the 813-acre campus in 1956.

Since 1956, the educational program at this campus has grown from six academic majors with an enrollment of 550 men, to 64 academic programs and an enrollment of over 10,000 men and women. The number of degrees granted increased from 54 in June, 1957, to over 1700 in 1972.

From his appointment as president of California State Polytechnic School in 1933 until his retirement in 1966, the late Dr. Julian A. McPhee was chief administrator of the San Luis Obispo and Kellogg-Voorhis campuses of California State Polytechnic College. In October, 1966, the Trustees of the California State University and Colleges formally established California State Polytechnic College, Kellogg-Voorhis as a separate state college. They named Dr. Robert C. Kramer president. In 1972 the university designation was made.

Further development of curricula and facilities as provided by the Legislature and the Trustees of the California State University and Colleges will insure the continuation of a valuable and distinctive polytechnic education for California's citizens.

ACCREDITATION

The university is accredited as a degree-granting institution by the Western Association of Schools and Col-

leges and is authorized by the California State Board of Education to recommend candidates for California Teacher Credentials, both elementary and secondary specializations, in a number of subject areas.

The School of Engineering is accredited by the Engineers' Council for Professional Development for its baccalaureate programs in Aerospace Engineering, Chemical Engineering, Civil Engineering, Electrical and Electronics Engineering, and Mechanical Engineering.

The School of Environmental Design is accredited by the American Society of Landscape Architects for its program in Landscape Architecture and recognized by the American Institute of Planners for its program in Urban Planning.

The School of Science is accredited by the American Chemical Society for its program in Chemistry.

CAMPUS SITE

Located south of the San Bernardino Freeway on the eastern slope of Kellogg Hill west of Pomona, the campus is one of the largest in the state university and college system. The buildings represent a careful blending of the tile-roofed Spanish ranch structures built by W. K. Kellogg and modern laboratory and classroom buildings of concrete and red brick. Campus development has preserved the beauty of the ranch and its original plantings. The combination of agricultural crops and livestock areas with science, engineering, and liberal arts facilities provides for the full range of instruction at Cal Poly, Pomona.

At the northeast corner of the campus is a multi-level interchange for the San Bernardino, Corona, Foothill, and Orange freeways, bringing the campus within easy access of much of Southern California. The campus is easily reached from downtown Los Angeles and San Bernardino as well as numerous other communities in Orange, Los Angeles, Riverside, and San Bernardino Counties.

ADMINISTRATIVE OFFICERS OF THE UNIVERSITY

President
Robert C. Kramer

Vice President for Academic Affairs
Hugh O. LaBounty, Jr.

Vice President for Administration and Student Affairs
James Bell

Director of Business Affairs
William E. Fox

Dean of Academic Planning
Kenneth H. Anderson

Dean of Graduate Studies
Robert L. Maurer

Dean of Undergraduate Studies
Don W. Schafroth

Dean of Continuing Education
John B. O'Hara

Director of the College Library
Harold F. Wells

Dean, School of Agriculture
Frederick E. Beckett

Dean, School of Arts
Albert J. Aschenbrenner

Dean, School of Business Administration
William E. Fox

Acting Dean, School of Engineering
Rodney D. Sutherland

Dean, School of Environmental Design

Dean, School of Science
Vincent E. Parker

Director of the Teacher Preparation Center
Dorothy M. Tucker

Executive Dean, Planning
Robert G. Bonde

Dean of Students
Henry House

The Graduate Council

The Graduate Council consists of two representatives of the graduate division faculty from each of the academic schools and the Teacher Preparation Center and ex-officio members from appropriate areas of the university. The council is advisory to the graduate dean in matters dealing with curriculum, graduate student affairs, graduate studies policy and other areas related to the university's graduate programs.

Harry A. Anthony
School of Environmental Design

Charles E. Bowen
School of Science

Charlotte A. Bray
Graduate Division, *Secretary*

William Carlquist
Graduate Student

Henry M. Clanton
School of Engineering

Homer D. Fausch
Director of Research, *ex officio*

Rodman F. Garrity
Teacher Preparation Center

Eugene K. Keating
School of Agriculture

John T. Lyle
School of Environmental Design

Robert D. Marshall
College Library, *ex officio*

Robert L. Maurer
Dean of Graduate Studies, *Chairman*

Russell F. McDonald
School of Agriculture

Gilbert J. McKee, Jr.
School of Business Administration

Joseph W. McKinley
School of Engineering

James C. Petersen
School of Business Administration

Raymond Riznyk
School of Science

Floyd H. Ross
School of Arts

Robert P. Rusby
Graduate Student

Lillian Wilds
School of Arts

ADMISSION, REGISTRATION, AND CREDIT

Requirements for admission to California State Polytechnic University, Pomona are in accordance with Title 5, *California Administrative Code,* Chapter 5, Subchapter 2, as amended by the Board of Trustees of the California State University and Colleges on November 24, 1970. A prospective applicant who is unsure of his status under these requirements is encouraged to consult with the Graduate Division Office or the Admissions Office.

Each applicant for any type of post-baccalaureate status, such as master's degree aspirants, those seeking credentials, and those interested in taking courses for professional growth, must file a complete application packet for admission to post-baccalaureate status within the appropriate filing period. A complete packet for admission to post-baccalaureate status includes an application for admission/readmission (for post-baccalaureate students), a residence questionnaire, a supplemental graduate admissions application, a data coding form, and the $20 non-refundable application fee. A post-baccalaureate applicant who was enrolled as an undergraduate student at this university in the quarter immediately preceding that for which he is applying is also required to complete and submit an application and pay the $20 non-refundable application fee. An applicant seeking financial aid should also complete and submit with the application material specified above, a preliminary financial aid application.

Since applicants for post-baccalaureate programs will be limited to the choice of a single campus on each application, redirection to alternative campuses will be minimal. In the event that a post-baccalaureate applicant wishes to be considered by more than one campus, it will be necessary for him to submit a separate application and fee to each.

Admission as a Post-Baccalaureate Student

In order to register for post-baccalaureate study, an applicant must file complete application forms and be accepted by the Office of Admissions and Records as a student. In addition, two sets of official transcripts must be *received* by the university no later than two weeks preceding the last day for payment of fees. The opening of the application period for each quarter is indicated in the calendar.

Applicants must request the registrars of all colleges or universities attended to forward official transcripts to the Office of Admissions and Records. Official transcripts will not be accepted directly from the applicant. The student should carry his own copies of his transcripts to show to the department faculty when requesting advice concerning either an advanced degree or a credential.

Admission with post-baccalaureate or graduate standing does not constitute admission to a graduate degree or credential program.

An applicant's objective is the particular program he wishes to enter and within that program the particular con-

centration or emphasis, if any, he wishes to pursue. An applicant declares his objective by filling in the appropriate space on the application form when applying for admission. Objectives include master's degree (by major), credential only, master's degree and credential, or neither degree nor credential.

Foreign applicants should begin the application process at least a year before the quarter in which admission is sought.

ADMISSION TO UNCLASSIFIED OR CONDITIONAL STANDING

For admission as an unclassified or conditional graduate or post-baccalaureate student, an applicant must hold an acceptable baccalaureate degree from an accredited institution and must meet the academic and other standards specified by the university at the time of application.[1]

Students admitted to the university who are not presently qualified for programs leading to master's degrees or credentials to be awarded through this institution will be placed in unclassified status. While in this status, they will be restricted from enrolling in certain courses for which attainment of classified status is a prerequisite.

LIMITATIONS ON ADMISSIONS

The admission of post-baccalaureate students with no degree or credential objective may be limited or suspended because of facility or staff availability. Master's degree or credential programs may be limited in enrollment whenever the lack of facilities and/or staff warrants.

[1] *California Administrative Code*. Title 5, Education, Section 41000.

ADMISSION TO SEEK A SECOND BACHELOR'S DEGREE

Admission to seek an additional bachelor's degree for holders of such degrees is processed by the Admissions Office in the same way as other undergraduate admissions. See the *University Catalog*.

ADMISSION TO CLASSIFIED STANDING

Classified standing is awarded to an applicant for admission to a degree program who meets all the criteria for admission specified in the departmental section of this Bulletin. An applicant admitted to a degree program conditionally will receive a written statement of conditions including the time limit for meeting them at the time of admission. As soon as all stipulated conditions have been met, the student may and should apply to his adviser for classified standing. An unclassified degree student who does not meet admission conditions may be dropped from graduate standing.

In departments or programs with limited enrollments due to lack of staff or facilities admission may be limited partly or entirely to applicants who qualify for unconditional classified standing.

ADMISSION OF CONTINUING BACCALAUREATE STUDENTS

A student who holds a baccalaureate degree from this university and plans to continue as a post-baccalaureate or graduate student must apply for readmission. This should be done during the final quarter of the senior year. The necessary transcripts will generally be on file, but it is the student's responsibility to be sure he has met requirements for re-

admission. Such students must meet departmental admission criteria and are subject to the same enrollment quotas and application fees as are new applicants.

ADMISSION OF FORMER STUDENTS

A student on leave of absence must file a notification of return from leave no later than 90 days after the beginning of the filing period for the quarter in which the leave expires. A former student returning to the university after an absence of more than one year must file a complete application for admission and pay the application fee.

ADMISSION FROM NON-ACCREDITED SCHOOLS

An applicant who is a graduate of a nonaccredited school who gives evidence of unusual promise and superior background may petition the department concerned for conditional graduate student status, and if the petition is granted, he may then proceed in the graduate program.

ADMISSION OF FOREIGN APPLICANTS

An applicant from a foreign country should contact the Office of Admissions or the Graduate Division at least one year in advance of the quarter in which he seeks admission so that all required materials can be supplied.

Students whose native language is not English must submit the results of the Test of English as a Foreign Language (TOEFL) prior to consideration for admission. Foreign nationals who are not graduates of the university will be accepted as graduate students only if they hold a baccalaureate degree from an accredited institution in the United States or Canada or have comparable academic credentials as approved by the University Office of Admissions. The admission of foreign students to graduate status may be limited or suspended due to facility or staff limitations.

TEST REQUIREMENTS

Some departments require new graduate students enrolling at this university with a degree objective to take the Aptitude Test of the Graduate Record Examination before or during the first quarter of residence. In some cases, admission will depend upon test scores.

The Admission Test for Graduate Study in Business is required for those who seek the Master of Business Administration degrees. Some departments also require the Advanced Test of the Graduate Record Examination in their subject matter areas. Other departments require a locally developed qualification examination. See the respective departmental sections of this Bulletin and the chart below.

Foreign applicants must take an English proficiency examination in addition to academic tests. Information concerning the Test of English as a Foreign Language may be obtained from the Counseling Center. No foreign applicants are excused from departmental requirements for academic tests or other qualifying examinations.

REQUIRED ADMISSION TESTS

Program	GRE Aptitude	GRE Advanced	ATGSB
Master of Architecture	X		
Master of Science in Biological Sciences	X	X	
Master of Business Administration			X
Master of Science in Business Administration			X
Master of Science in Chemistry			
Master of Science in Economics	X	X	
Master of Arts in Education			
Master of Engineering			
Master of Arts in English			
Master of Landscape Architecture	X[1]		
Master of Science in Mathematics			
Master of Science in Physical Education			
Master of Urban Planning	X[1]		

[1] Under 3.0 undergraduate GPA.

Fees and Expenses

Tuition is not charged to legal residents of California; however, fees for various materials, activities, and services are charged. Tuition is payable by nonresidents and foreign-visa students in addition to fees required of other students. *All fees are subject to change without advance notice by the trustees of the California State University and Colleges.*

No fees of any kind shall be required of or collected from those individuals who qualify for such exemption under the provisions of the Alan Pattee Scholarship Act.

SERVICE FEE AND TUITION

All Students

Material and Service fee, per quarter

0– 3.9 units	$26.50
4– 7.9 units	30.00
8–11.9 units	33.00
12 or more units	39.00
Facilities fee	2.00

Nonresidents (Domestic and Foreign)

Tuition (15 or more units) per quarter	370.00
Tuition (less than 15 units) per unit or fraction per quarter maximum	25.00

Summer Session

Per quarter unit	18.00

MISCELLANEOUS FEES

Application fee charged of all applicants payable by check or money order at time of applying *nonrefundable*	20.00
Change of program	1.00
Check returned for any cause	5.00
Conference, short course or institute, per person	Estimated Cost
Sponsored program fee (per week)	10.00
Course credit by special examination (per unit)	1.00

Failure to meet administratively required appointment or time limit 2.00
Graduation for master's degree candidates (not a state fee)..... 12.00
Late registration..... 5.00
Library ..... See schedule in library
Transcript of record 1.00
Parking fee
Nonreserved spaces (per quarter):
Each student enrolled for more than six units..... 9.00
Each student enrolled for six units or less..... 4.00
Each alternate car in addition to fee for first vehicle ...1.00
Special groups, per week.....1.00
Associated Students, Inc., membership (not a state fee):
Fall quarter 10.00
Winter, spring and summer quarters, each 5.00
College Union (not a state fee):
Summer quarter 3.00
Fall quarter 8.00
Winter, Spring quarter each 6.00

REFUNDS

Any student who withdraws from the university may be entitled to a refund of a portion of registration fees paid. A student must file an application for a refund with the Records Office at the time of withdrawal to be eligible for a refund.

DETERMINATION OF RESIDENCE

The following statement of the rules regarding residency determination is not a complete discussion of the law, but a summary of the principal rules and their exceptions. The statutes governing residence determination for tuition purposes are found in Education Code Sections 23753.2—23762, Government Code Sections 243—244, and Civil Code Section 25. Those regulations are in the process of amendment to implement the uniform residence determination law enacted in statutes 1972, Chapter 1100 (AB 666) and thus are not reproduced here. The revised regulations may be inspected at the Office of Admissions. The determination of whether a student qualifies as a "resident" for admission and tuition purposes is made by the university after review of a residence questionnaire completed by each student upon admission. The residence questionnaire is designed to provide to the college information necessary for residency determination, including the applicability of any exceptions.

The general rule is that a student must have been a California resident for at least *one year* immediately preceding the residence determination date in order to qualify as a "resident student" for admission and tuition purposes. A residence determination date is set for each academic quarter and is the date from which residence is determined for that quarter.

Whether a student has acquired California residence usually depends on whether the student has attained majority; i.e., has become an adult. Majority is attained at 18 years of age. If the student is a minor, residence is derived from (and therefore is the same as) that of his or her father. If the father is not living, the student's residence is that of the mother while she remains unmarried. A minor cannot change his residence by either his own act or that of his guardian so long as there is a living parent.

Upon attaining majority, the student may acquire a residence apart from his or her parents. The acquisition of California residence by an adult requires both physical presence in the state and, at the same time, an intent to remain in California indefinitely, that is, an intent to regard California as one's permanent home. Although physical presence is easily proven, subjective intent is more difficult, requiring the student to present evidence of various objective manifestations of such intent.

A woman may establish her own residence even though she may be married. An alien is not eligible to acquire residence until admitted into the United States for permanent residence under an immigrant visa.

There are several exceptions from nonresident tuition. These rules are limited in scope, and are quite detailed. If it appears that any of them may be applicable, the student may wish to discuss the matter with the residence clerk of the university. Some of the exceptions provide for:

1. Minors whose parents were residents of California but who have left the state. When the minor reaches age 18, the exception continues for the year to enable the minor to qualify as a resident student.
2. Minors who have been present in California for more than a year before the residence determination date, and entirely self-supporting for that period of time, are treated as adults for purposes of determining residence.
3. Dependent children and spouses of persons in active military service stationed in California on the residence determination date. This exception applies only for the minimum time required for the student to obtain California residence and maintain that residence for a year. The exception is not affected by transfer of the military person directly to a post outside the 50 states and District of Columbia.
4. Military personnel in active service stationed in California on the residence determination date for purposes other than education at state-supported institutions of higher education. This exception applies only for the minimum time required for the student to obtain California residence and maintain that residence for a year.
5. Certain credentialed, full-time employees of community college districts.
6. Full-time State University and College employees and their children and spouses. This exception applies only for the minimum time required for the student to obtain California residence and maintain that residence for a year.
7. Certain exchange students.
8. Children of deceased public law enforcement or fire suppression employees who were California residents and who were killed in the course of law enforcement or fire suppression duties.
9. A person in continuous full-time attendance at an institution who had resident classification on the effective date of Statutes 1972, Chapter 1100 (AB 666) shall not lose such classification as a result of adoption of the uniform student residence law on which this

statement is based, until the attainment of the degree for which currently enrolled. *(Education Code* Section 22862).

It is anticipated at the time this is written that the new residence law will become effective in early March, 1973. Students classified incorrectly as residents or incorrectly granted an exception from nonresident tuition are subject to reclassification as nonresidents and payment of nonresident tuition in arrears. Resident students who become nonresidents, and nonresident students qualifying for exceptions whose basis for so qualifying changes, must immediately notify the Office of Admissions and Records. Applications for a change in classification with respect to a previous term are not accepted.

The student is cautioned that this summation of rules regarding residency determination is by no means a complete explanation of their meaning. The student should also note that changes may have been made in the rate of nonresident tuition between the time this bulletin is published and the relevant residence determination date.

DEBTS OWED TO THE UNIVERSITY

From time to time a student may become indebted to the university. This could occur, for example, when the student fails to repay money borrowed from the university. Similarly, debts occur when the student fails to pay university residence hall or library fees, or when the student fails to pay for other services provided by the university at the request of the student. Should this occur, Sections 42380 and 42381 of *Title 5* of the *California Administrative Code* authorize the university to withhold "permission to register, to use facilities for which a fee is authorized to be charged, to receive services, materials, food or merchandise or any combination of the above from any person owing a debt" until the debt is paid. For example, under these provisions the university may withhold permission to register, and may withhold other services, such as grades and transcripts. If a student feels that he or she does not owe all or part of a particular fee or charge, the student should contact the business office. The business office, or another office to which the student will be referred by the business office, will review the pertinent information, including information the student may wish to present, and will advise the student of its conclusions with respect to the debt.

Registration

GENERAL PROCEDURES

A new student will receive a registration fee statement with his notice of admission. Registration fees must be received in the Accounting Office not later than the deadline date indicated on the fee statement. Classes will not be scheduled until these fees are paid. A person applying or admitted late is not assured of admission to classes.

Instructions for registration of a continuing student are included in the class schedule published prior to the opening of each quarter.

Credit for a course is given only when a student is properly registered in the university and successfully completes the course. An individual is not properly registered unless his completed registra-

tion forms listing the program approved by his adviser are on file in the Registrar's Office. A student may not be admitted to a course unless he is properly registered in the university.

Late registration may be permitted after classes begin upon payment of a $5.00 late fee until the date noted in the academic calendar.

CONCURRENT ENROLLMENT

A student who wishes to register at another institution while in attendance at this university must file a petition for concurrent enrollment, using the graduate academic petition form. No credit will be granted for work taken at another institution concurrent with work at this university unless this petition has been approved *in advance.*

HOLDING OF RECORDS

Student records may be placed on a hold status because of financial or other obligations to the university. While the student's records are on hold he will not be allowed to register, nor will transcripts of credits be released. Records will be held until the obligation is cleared to the satisfaction of the office or department instituting the hold.

HONORABLE DISMISSAL

Honorable dismissal automatically will be noted on the transcript of each student who graduates or withdraws from the university, unless he has been disqualified because of misconduct.

ADDING OR DROPPING COURSES

Each student is responsible for every course listed on his official program card. Any change which is in addition or deletion of a course or change in section must be made on the proper form and filed with the Registrar's office on or before the dates published in the academic calendar. Forms for changes in program may be obtained from the student's adviser.

Courses may be added or sections changed through the fifth day of classes. Courses may be dropped without penalty (no grade assigned) through the 14th calendar day following the day on which classes begin. After this date and through the seventh week of classes, a student may withdraw from a course in which he is enrolled only for serious and compelling reasons. Permission to withdraw during this time period will be granted only with the approval of the professor, the department chairman, and the school dean. All requests for permission to withdraw under these circumstances and all approvals shall be made in writing on a withdrawal form which states the reasons for the withdrawal. For course withdrawals during this period the instructor will assign a grade of W (withdraw).

Withdrawals shall not be permitted during the final three weeks of instruction except in cases where the cause of withdrawal is due to circumstances *clearly* beyond the student's control and the assignment of an incomplete is not practicable. Ordinarily, withdrawals in this category will involve total withdrawal from the university.

WITHDRAWAL FROM THE UNIVERSITY

Students who desire to withdraw because of personal, academic or other problems should consult with, and ob-

tain forms from, the Counseling Center. After official clearances are received by the student, the Withdrawal Application is submitted to the Records Office. Students leaving the university who do not officially withdraw are subject to failing grades in their classes. The grading policy for students who withdraw from the university after the 14th calendar day of classes is the same as for students who drop courses after this date (see Adding and Dropping Courses).

AUDITING COURSES

Auditing a course is attending classes for no credit. A student must be registered and must have paid fees in order to audit a course. Audited courses must be included on the student's official program card, and they are designated by AU beside the course unit listing. Enrollment in any course as an auditor shall be permitted only after students otherwise eligible to enroll in the course on a credit basis have had an opportunity to do so. Auditors are subject to the same fee structure as credit students and regular class attendance is expected. Once enrolled as an auditor, a student may not change to credit status unless such a change is requested on or before the last day to add classes. The deadline for changing from credit to audit is the same as for dropping a course. The materials and services fee is determined on the basis of the total units of both credit and audit courses in which the student is enrolled.

TRANSFER TO OTHER INSTITUTIONS

A student who plans to transfer from this university to another college or university, should, at the earliest possible date, request that his transcript of record be forwarded by the Registrar's Office (see fees and expenses schedule for charges) to the new institution.

REVISION OF REQUIREMENTS

A student in continuous attendance and continuing in the same degree program may elect to meet the graduation requirements in effect either at the time of entering the curriculum or at the time of his graduation. Substitutions for discontinued courses not taken by the student may be authorized or required by the student's major department.

A student granted a leave of absence may continue on the same degree program he had before leaving, so long as he complies with leave of absence regulations.

Course Numbering System

Courses are grouped into number series indicating the level at which they are presented. Graduate-level courses are numbered 500 through 699. These courses are open only to graduate and post-baccalaureate students, except that seniors may take 500-599 courses under specified conditions. See "Graduate Courses Taken by Undergraduates" elsewhere in this bulletin.

100-299 Courses taught primarily in the freshman and sophomore years and generally introductory in nature.

300-399 Courses primarily for advanced undergraduate students, usually having prerequisites, but bearing no graduate degree credit, except by petition.

(NOTE: Courses numbered 300-499 may be used for post-baccalaureate credential credit.)

400-499 Courses for advanced undergraduates, graduate, and post-baccalaureate students. Each department will specify which of these courses may be applied to master's degrees. Courses 461, 462, Senior Project, will not apply to master's degree requirements.

500-599 Courses open only to graduate and post-baccalaureate students or to seniors with prior approval.

600-699 Open only to unconditionally classified graduate students.

900-999 Courses including specialized workshops, seminars and institutes designed to provide professional and occupational improvement.

Grading System

The university employs the following grading system for graduate courses:

A—Outstanding work, representing effective representation, unusual competence and high skill.

B—Excellent work, meeting full requirements for performance at the graduate level.

C—Meets minimum requirements of the course; acceptable for graduate credit.

F—Fail; below minimum requirements of graduate courses. "D" work in a graduate course is assigned a grade of "F".

I—Incomplete AU–Audit (no credit)

SP—Satisfactory Progress; used in connection with courses that extend beyond one academic quarter. The sumbol indicates that work in progress has been evaluated as satisfactory to date but that the assignment of a grade must await the completion of additional course work. Cumulative enrollment in units attempted may not exceed the total number applicable to the student's degree objective. All work is to be completed within one calendar year of the date of first enrollment. A final grade will be assigned to all segments of the course on the basis of overall quality. Any extension of this time period must receive prior authorization by the school dean.

W—Withdrawal; indicates that the student was permitted to drop the course after the 14th calendar day following the day on which classes begin with the approval of the instructor, the department chairman, and the school dean. It carries no connotation of quality of student performance and is not used in calculating grade-point average or progress points.

Grade points are assigned as follows:

A—4 points	I—0 points
B—3 points	F—0 points
C—2 points	SP—0 points

When a grade of "D" is assigned for undergraduate course work taken by a graduate student, neither the credit nor the content of that course shall apply to a master's degree.

INCOMPLETE

An incomplete signifies that a portion of required course work has not been completed and evaluated in the prescribed time period due to unforeseen,

but fully justified reasons and that there is a possibility of earning credit. It is the responsibility of the student to bring pertinent information to the professor and to reach agreement on the means by which the remaining course requirements will be satisfied. This agreement will be in written form, copies to be provided the student, the professor, and the department chairman. A final grade is assigned when the work agreed upon has been completed and evaluated.

An incomplete must be made up within one calendar year immediately following the end of the quarter in which it was assigned. *This limitation prevails whether or not the student maintains continuous enrollment.* Failure to complete the assigned work will result in an incomplete being counted as equivalent to an "F" for grade-point average or progress point computation.

Incomplete is not to be used for courses that normally extend beyond one quarter, such as thesis or project. In such cases the "SP" symbol will be used.

A student may not remove an incomplete by re-enrolling in the course. In cases where repetition of the course is deemed appropriate, the student will be assigned a withdrawal or failing grade rather than an "I".

If a student subsequently completes a course which is recorded as incomplete on a transcript from another institution, it is his responsibility to submit a corrected official transcript and advise the registrar that he wishes to receive credit.

PLAGIARISM

Students are hereby informed that the university considers plagiarism a serious academic offense which subjects those engaging in the practice to severe disciplinary measures. Moreover, one form of plagiarism, the use of purchased papers, has been considered so serious that the State Legislature has enacted a law providing criminal penalties for sale or other distribution of such materials. Students are, therefore, cautioned against this and all forms of plagiarism.

SERVICES

Health and Medical

Medical services, paid for by the state and the student, are designed to provide, on an outpatient basis, the services usually rendered by the family physician. Any specialist care or hospitalization is at the student's expense unless student insurance is purchased at the time of enrollment. Full-time enrollees may utilize the health services daily Monday through Friday, between 8 a.m. and 5 p.m.

Counseling

Professional counselors are available in the Counseling Center for the purpose of assisting students. Both individual and group counseling are utilized.

Academic and occupational guidance is provided by a faculty adviser in the student's major department.

Veterans Affairs

The university is approved for the training of veterans of the military services and their dependents under educational assistance programs established by the state and federal governments. The Records Office provides assistance to those desiring to initiate or continue their college education under these programs.

Authorization for training under all federal laws must be obtained from the Veterans Administration through its regional office at 11000 Wilshire Boulevard, Los Angeles, California 90024. Veterans with no prior training under the G.I. bills are urged to request their letters of eligibility at least two months before enrolling. Those who are transferring from another school should submit their transfer requests at least one month before enrolling.

Vocational Rehabilitation

Students who have a physical, emotional, or other disability which handicaps them vocationally may be eligible for the services of the State Department of Rehabilitation. These services include vocational counseling and guidance, training (with payment of costs such as books, fees, tuition, etc.) and job placement. Under certain circumstances students may also qualify for help with medical needs, living expenses and transportation.

Appointments may be made with the Rehabilitation Clerk in the Records Office or by contacting the State Department of Rehabilitation office at the Pomona Branch Office, 553 North Gibbs Avenue, Pomona, California 91767, telephone (714) 629-9608.

Career Placement

A centralized career planning and placement service is available to all students of the university. A sincere effort is made to help the student find employment, but no guarantee of placement is made.

Many industrial, agricultural, educational, and business representatives visit the campus to interview graduating students. Career placements are effected through this extensive on-campus interview program supplemented by a career

referral service. A follow-up program conducted by the Placement Center includes contacting both the graduate and the employer to appriase the effectiveness of instructional programs in relation to employer needs and to determine the satisfaction of employer and employee.

Educational Placement

Every candidate for a teaching credential registers with the Placement office before or during the quarter prior to completion of credential requirements. Registration includes the preparation of personal data and the listing of references for the educational teacher placement folder. This folder is maintained permanently by the Placement Center for use whenever the teacher wishes to seek a new position. Cooperation of the candidate in keeping information in the folder up-to-date is necessary for the most effective service.

Bookstore

The university bookstore, operated by the university's own Cal Poly Kellogg Unit Foundation, is located in the Student Center, adjacent to the central quadrangle. The bookstore is stocked with all necessary textbooks, supplies, and many reference materials required for graduate courses. It stocks supplies for preparation of master's degree theses and projects.

Residence Halls

New students interested in on-campus housing should request a housing application at the time of application for admission to the university. Contracts issued for the academic year provide for both room and board. Fee payments may be made in periodic installments in accordance with the schedule available from the Housing Office.

Head resident positions are sometimes available to married graduate students who have no children. Interested applicants should communicate with the Housing Manager for information.

Continuing Education

A continuing education center, Kellogg West, is situated on the hill west of the Performing Arts Center and just off the central mall. Included in the first phase of construction are a conference center with an auditorium, meeting rooms, exhibit areas, and dining facilities for 350 people, and residence accommodations for 102 persons. Later construction will provide additional lodging to increase the total residence capacity to 200.

The center has been made possible by a $3 million grant from the W. K. Kellogg Foundation, Battle Creek, Michigan, and contributions from numerous members of the business and industrial community. The Kellogg contribution is the largest single grant received by a member of the California State University and College system.

Two special objectives of the center are to bring to the West outstanding continuing-education programs held previously in other sections of the country, and to give assistance to organizations or firms developing in-residence conference programs.

The center staff is available to assist in program planning or professional evaluations, in securing effective resource and teaching personnel, and in

serving as an experienced and knowledgeable host. Priority is given to programs which involve the college faculty as teachers and which are particularly valuable to the faculty and staff in keeping current a teaching knowledge of one or more occupational fields.

Information about the center and its programs is available from the Dean of Continuing Education, Kellogg West, California State Polytechnic University, Pomona, California 91768. Representatives of prospective planning groups are invited to visit the center.

University Foundation

The Cal Poly Kellogg Unit Foundation, Inc., was organized and is operated to provide essential services and facilities which are an integral part of the educational program of the university.

Foundation activities include the operation of all campus eating facilities, the college bookstore, and the fiscal administration for student instructional projects, supplementary health services, instructional research programs, international programs, workshops, conferences, institutes, and the Arabian Horse Show.

Alumni Association

The Cal Poly, Pomona Alumni Association is an association of graduates and former students. The operations of the organization are carried out by a Board of Directors consisting of a president; six vice presidents, representing the instructional areas of the university program; secretary; treasurer; executive secretary and 10 directors.

In addition to regional and local meetings of alumni, the association welcomes members to receptions during Poly Vue, maintains an alumni directory and publications, and annually honors an Alumnus of the Year.

Information about the association may be obtained from the alumni adviser on the campus.

Arabian Horse Program

The oldest campus tradition is the Arabian horse show, first started by W. K. Kellogg in 1926, and continued after his ranch became a university campus. Public performances are given every Sunday, October, November, and January through May at 2 and 3:30 p.m. The program, featuring the Arabian horse under both English tack and western stock saddle, is planned and handled and the horses are trained by the college's students and staff.

The shows are designed to promote interest in the Arabian breed and point up the horse's versatility, beauty, and intelligence. The Kellogg ranch has been one of the world's outstanding Arabian horse breeding farms, and the college continues the program today, perpetuating the Arabian and making valuable blood lines available to the public. The sixty to seventy Kellogg Arabians are a noted attraction for thousands of Southern Californians and tourists who view the show each year. A new horse unit, provided by private donation, will be in use in late 1973.

GRADUATE SCHOLASTIC REQUIREMENTS

Graduate Studies Program

STANDARDS OF GRADUATE STUDY

Graduate study deals with more complex ideas and demands more sophisticated techniques, searching analysis, creative thinking and more time than undergraduate study. The research required is extensive in both primary and secondary sources and a high quality of writing is expected.

A student seeking a graduate degree enjoys certain privileges not available to other students and is obligated to follow some procedures not required of those pursuing other objectives. Careful and prompt attention to required procedures should be followed in pursuing a master's degree program to prevent unnecessary confusion and delay. Although advisory services are provided to assist students, the student alone is responsible for following the procedures and completing the steps required in his program. Failure of an adviser to remind a student of a requirement or deadline date is not acceptable as a basis for waiver of the requirement. Requirements for advanced degrees, both procedural and substantive, may be waived only upon a written request of the student and/or committee concerned and approved by the Dean of Graduate Studies and by the academic school dean, if required by school policy. Petition forms are available in department offices and the Graduate Division Office.

A student who wishes to enroll in post-graduate courses before his transcripts or test scores have been transmitted to the department concerned may receive unofficial advisement by making an appointment with a graduate adviser at the appropriate department or school office. If the student brings his own copies of transcripts with him to the conference, his adviser can be specific in his suggestions, but the adviser can make no formal decisions on the basis of hand-carried transcripts.

The Dean of Graduate Studies maintains a progress file of records on each graduate student in his office and is available to assist graduate students with information or counsel. Specific program advising is always done by the department or school adviser.

REQUIREMENTS FOR MASTER'S DEGREES

Graduate programs are based upon adequate preparation at the undergraduate level. A student who plans to become a candidate for a master's degree must hold a bachelor's degree substantially equivalent to that of California State Polytechnic University, Pomona in the discipline in which he intends to do his advanced work, or he must be prepared to undertake additional work to make up any deficiency.

A student seeking a master's degree at this university will submit an acceptable thesis or project which will consist of the presentation of an appropriate topic or the projection of a design or other project related to the student's primary emphasis in graduate study.

No later than the time the student applies for advancement to candidacy, he will consult with an adviser regarding a topic. Before the student is certified for the master's degree, he may be required to present a defense of his thesis in addition to meeting all other requirements prescribed in his approved program.

GENERAL REQUIREMENTS

The requirements for graduation depend upon the master's degree program undertaken and upon the major field. The following requirements apply to all master's degrees offered by the university.

1. The program for the one-year master's degree must consist of not less than 45 units in courses numbered 400 and above with a minimum of 24 units of 500 and 600 level courses completed at the university consistent with departmental requirements. Work unacceptable for graduate credit in the school where it was taken is not acceptable for graduate credit at this university.
2. At least 36 units of 400, 500 and 600 series offerings must be completed in residence at this university.
3. Two-year master's degrees have higher unit requirements than specified above. See detailed information in the appropriate sections in this Bulletin.
4. A candidate for the master's degree must earn a 3.0 (B) average in all graduate work taken at this university and in his degree program. No course with a grade lower than "C" may apply toward the fulfillment of degree requirements.
5. A thesis or project must be successfully completed and approved.
6. A favorable vote of the department, school, or center faculty is required before the degree may be conferred.
7. A graduate student who expects to receive a degree at the end of any quarter must complete an application for graduation in the Evaluations Office prior to the deadline listed in the academic calendar. Graduates will not be permitted to participate in commencement ceremonies until all degree requirements have been met.

DEGREE REQUIREMENTS

Specific degree requirements and graduate course offerings currently available are outlined in departmental sections of this Bulletin. Each student seeking a graduate degree will be held responsible for meeting specific requirements applicable to the program of his choice and to fulfilling general master's degree requirements.

DEGREE PROGRAM

At the time a student is admitted to a master's degree curriculum, he should arrange with his adviser to prepare an official program. If he is admitted as a classified graduate student, he should accomplish this step as early in the first quarter of attendance as possible. A program must be prepared and submitted for approval no later than the date the student applies for advancement to candidacy.

Each department offering a master's degree has a distinctive form which is used to define the student's program. When the program has been approved, a copy is sent to the student and to the adviser who has approved it. The original is retained in the Evaluations Office

and is used as the official record of the student's progress toward the degree. It will be updated at least once a quarter, by means of a computer printout of the complete record. The student and his adviser will complete the form, listing all courses and other requirements which the student must fulfill to receive the degree. The proposed program must meet the following specifications:

1. At least 45 quarter units of graduate work must be included in the graduate degree program. Of these, at least 24 units must be courses numbered 500-699. These requirements are appropriately modified for programs requiring more than 45 units.
2. The complete program may be chosen from within the offerings of the major department or it may include offerings drawn from other fields acceptable to the major adviser or committee. In developing the program, the student and adviser will seek to plan a meaningful pattern of courses focused upon the objectives of the major and the student. If the candidate has deficiencies or lacks prerequisites to enroll in certain courses necessary to his program, he will be expected to complete them in addition to the minimum requirements of his approved master's degree program. Advisers will permit the use of already completed courses in a master's degree program only if they clearly fit into the requirements of the student's curriculum.
3. No courses in methodology or directed teaching may be included in a master's degree program.
4. No more than nine quarter units of credit for thesis or project may be included. The master's degree program must be approved by the candidate's departmental graduate committee and verified by the Dean of Graduate Studies. The student and adviser receive copies of the approved program, which is an official agreement between the institution and the candidate.

ELECTION OF REGULATIONS

Regulations governing requirements for a master's degree become effective when classified graduate student status is achieved.

A graduate student remaining in continuous attendance after achieving classified status may elect to meet the degree requirements in effect either at the time of his classification or at the time he completes the last requirement for the degree, except that substitutions for discontinued courses may be authorized or required by the department offering the degree.

THESIS OR PROJECT

A student may register for course 695 (project) or 696 (thesis) only after he has been advanced to candidacy in a master's degree program. Before registration for thesis, the student must have conferred with his thesis adviser and the departmental graduate coordinator, if required, and have an officially appointed thesis committee and a tentative subject. Each student registering for thesis or project is required to register each succeeding regular quarter until the work is complete in order to receive university services. During any break in residence, either nonenrollment or leave of absence, a student may not use university facilities or receive faculty assistance. When a student has failed to maintain resident

status through continuous registration or leave of absence after commencing a thesis or project, his readmission to the program will require departmental approval.

A thesis or project in the official master's degree program will carry not less than three nor more than nine units of credit depending upon departmental policy. When the thesis has been completed, the committee has signed the approval page and there has been library clearance of the thesis, the credit for course 696 will be submitted by the professor to be recorded on the official transcript. Deadline dates for submission of the thesis to the Graduate Division Office can be found in the academic calendar. Projects must be completed on the same time schedule but may have separate departmental rules for approval and submission.

The student must submit the approved original copy of the thesis to be deposited in the library. Arrangements for binding are made through the Graduate Division. Further information is contained in the thesis instructional manual available at the Graduate Division Office and in department offices.

The Cal Poly Kellogg Unit Foundation, Inc., has made available a loan fund for students who find it impossible to finance master's degree thesis and project costs. Up to $100 may be borrowed on a short-term basis. The loan is limited to direct costs for this purpose including research or other materials and reproduction and binding. Applications may be made through the college financial aids office.

LIBRARY FACILITIES

The university library's book collection and reference services are organized on a broad subject divisional plan: Social Science-Humanities and Science-Technology. Reference books are available and reference librarians who specialize in the disciplines within the two broad subject areas can offer assistance. The library maintains collections of journals and other materials required to support graduate-level research.

The library has several group study rooms which may be scheduled by students on a day-to-day basis for seminars. Book trucks which may be locked and left in the library are available on a quarterly basis to graduate students working on theses and projects.

Library services of special significance to graduate students are inter-library loan and individual or group assistance in literature research techniques by librarians of the Reference Department, and loan privileges at California State Universities at Fullerton, Long Beach, and Los Angeles and California State College, San Bernardino.

FOREIGN LANGUAGE

A reading knowledge of a foreign language may be required by some departments. A student should consult his adviser or the section of this Bulletin in which requirements for his degree field are given.

TIME LIMIT

The graduate degree program of not less than 45 units must be completed within seven years from the time the first course which applies to the degree requirements is started. This seven-year time limit, at the option of the university, may be extended for students who pass a comprehensive examination in the entire subject field.

LEAVE OF ABSENCE

When a student finds it necessary to interrupt his progress toward a degree for a reason acceptable to the appropriate university authorities, he may be granted a leave of absence. A student on leave of absence may, upon return from the leave, continue in the same program he had prior to the leave, and he retains the right to select requirements in effect at the time he entered or reentered the curriculum.

A leave of absence may be granted after the student has filed a petition, approved by his adviser, department chairman, and school dean, which specifies the reasons for the leave and the duration of the leave, with the Registrar. A student granted a leave of absence has a commitment from the university to be readmitted because of the educational hardship inherent in the interruption of his degree program. This commitment must be validated by a written notice to the Registrar of return from leave for the quarter of return specified in the leave application no later than 90 days after the opening date of the application filing period for that quarter.

The only routinely approved reasons for leave of absence are illness and military service. Leaves may be granted for a maximum of one year or four consecutive quarters. A request for leave of absence must be filed prior to the period of absence. Retroactive leave requests will not be approved.

Failure to return from leave as specified in the approved petition will be considered withdrawal from the university. Under such circumstances, reenrollment will require a full application for readmission under the same circumstances as any new or returning applicant.

ADVANCEMENT TO CANDIDACY

In order to progress toward the master's degree a classified graduate student must be advanced to candidacy for the degree. Requesting advancement to candidacy is the responsibility of the student. The following qualifications and procedure are necessary:

1. Scholarship—At the time the student applies for candidacy, his grade-point average for all graded degree program courses must be at least 3.0 (B). In addition, his grade-point average for all graded courses taken at this university subsequent to receipt of his bachelor's degree must be at least 3.0 (B). Courses completed more than seven years previous to application will not be included when computing this average. A student may not be advanced to candidacy before he has completed at least nine units of work, including at least one graduate level course, which are acceptable to the school, department, or center in which the advanced degree is sought. Application should be made no later than the quarter in which a student completes 18 units of credit in his degree program or 40 percent of the required credit in a professional program.
2. The student should initiate an application for advancement to candidacy. Forms are available at the Graduate Division and in departmental offices.
3. Along with the completed request for candidacy, the student will submit an official master's degree program form if one is not already on file. The student and his adviser will complete the form, listing all

courses and other requirements which the student must fulfill to receive the degree.

4. Generally, 60 percent of the required units of graduate work must be taken after advancement to candidacy as part of the degree requirements.
5. When action has been taken on a graduate student's application for advancement to candidacy, the student will receive a letter from the Dean of Graduate Studies informing him of the action. If the application is denied the reasons for denial will be stated.

Academic Policies

SCHOLARSHIP REQUIREMENTS

All graduate and post-baccalaureate students, classified or unclassified, may be disqualified from the university if their postgraduate grade point average on work attempted falls below 3.0 after one quarter of attendance.

MINIMUM GRADE POINT AVERAGE

If a graduate student completes his master's degree approved program with less than a 3.0 (B) average, the student's major department may (1) terminate his program, or (2) require him to take additional courses in an attempt to raise his program grade point average to the minimum 3.0. When the student's major department recommends that he be allowed to do the latter, the additional courses selected must:

1. Be at least two courses at the 500-699 level and total not less than six quarter units.
2. Apply directly to the student's master's degree objective, although they need not be drawn from offerings in the student's major department.
3. Be new courses (courses previously completed but not originally listed in the master's degree program may not be used).

If the student fails to earn the minimum 3.0 grade point average on completion of the revised master's degree program as outlined above, his program will be terminated without award of the master's degree.

Grades earned at another institution may not be used to offset grade point deficiencies in courses taken at this university.

CREDIT BY EXAMINATION

A student may be permitted, at the discretion of his school dean, to obtain credit by examination for courses in subject matter fields in which he is especially qualified through previous education or experience and for which credit has not otherwise been given. Units of credit received through this procedure may not apply toward the residence requirements for any of the degrees or credentials offered by the university. Detailed instructions for applying for credit by examination may be obtained from the Registrar's Office.

If approved, these credits will apply to graduate objectives, as appropriate, and will be recorded on the student's permanent record as graduate credit, if requested.

REPETITION OF COURSES

A student who has received a grade of "F" in a graduate course (or a grade of "D" or "F" in an undergraduate course included in the degree program) may repeat the course and receive the

grade assigned by the professor under whom the course is repeated. The repeated course will replace the previous entry in the student's permanent record.

GRADUATE COURSES TAKEN BY UNDERGRADUATES

A senior with an upper-division grade-point average of at least 2.5 may petition through his major department to use part of his senior year load as graduate credit provided the following conditions are met:

1. The adviser endorses the request.
2. Neither the courses involved nor the credit for them is needed to complete requirements for the baccalaureate degree.
3. The courses are at the 300, 400, or 500 level.

MAXIMUM LOAD

The maximum load for graduate students is normally 16 units per quarter. Students who are employed full time should not exceed eight units per quarter. A graduate student holding a graduate assistantship may earn a maximum of 10 units each quarter he has the assignment. Proportionate class load reductions are made for other assignments and for outside employment. Exceptions may be made in appropriate cases by academic petition through the major professor.

CONCURRENT ENROLLMENT

A graduate student enrolled at the university may enroll concurrently for additional courses at another institution only with advance written approval from the student's academic adviser and the Graduate Division on a graduate academic petition form. Permission will generally not be granted when the study load in the proposed combined program exceeds that authorized at this university.

TRANSFER CREDIT

If accepted by the faculty of the discipline involved, graduate credit from another accredited institution may be applied toward the master's degree. Directed teaching and methods courses may not be used in master's degree programs.

Correspondence courses may not be used to satisfy degree requirements. Extension course work may be used to satisfy prerequisites or degree requirements when such work is acceptable to the department or school offering the master's degree and by petition for such credit. See the appropriate sections for special regulations applying to professional master's degrees (more than 45 units).

COURSES TAKEN BY NON-OBJECTIVE STUDENTS

Courses taken in non-objective post-baccalaureate standing will be accepted in fulfillment of degree requirements only if the department and graduate adviser accept them on an advanced program. Such work taken when the student is not enrolled in a program must average "B" or better with no grades below "C" if the student wishes consideration for classified status for an advanced degree.

ENROLLMENT IN A NEW MASTER'S DEGREE PROGRAM

In special instances, a disqualified graduate student may be permitted to enroll in a different graduate program. All cases involving the reinstatement of disqualified graduate students must have the approval of the graduate committee in the new department.

A student in good standing in a master's degree program may transfer to another program with the approval of the new department. The amount of credit transferred from one program to another will be determined by the new department. Credit earned at this university in one master's degree program may be carried from that program to another.

CONCURRENT DEGREES

A student may not enroll for a bachelor's and a master's degree or for two master's degrees concurrently.

INTERNATIONAL STUDY

The university participates in the California State University and Colleges' program of study abroad. Under this program, some courses taken at designated foreign universities, when arranged in advance through the appropriate department, may be applied toward the requirements for a degree awarded by this university. It is important that plans be completed several months in advance of starting such a program. For details, consult the international study adviser and the university catalog.

CHANGES IN OBJECTIVE

Official changes in graduate objective are to be initiated in the Graduate Division Office. A change of objective may be one or more of the following:

1. Changing from one major field to another for the master's degree.
2. Adding a credential objective to an existing master's degree objective.
3. Adding a master's degree objective to a credential objective.
4. Changing from no objective to some stated objective as listed in this Bulletin.

The evaluation of credits transferred to the university is based in part upon the objective indicated on the application for admission. Thus, a change in objective may affect the acceptance of transfer credits. A candidate who wishes to change his objective from that indicated on his original application must follow these procedures:

1. Obtain a graduate student academic petition from the Graduate Division.
2. Obtain the signatures of the faculty adviser and the graduate coordinator of the department to which he plans to transfer.
3. Submit a new graduate program in the new discipline.

A student who discontinues working for a master's degree in one department to undertake master's work in another department must replace the first master's program, if he has one, by one in the new field. Degree credit may be transferred from the original program, but the transfer of credits must be approved by the new department.

Financial Assistance

Various forms of financial assistance are available to qualified students. The university Placement Office maintains an employment bureau to assist students in obtaining part-time employ-

ment while in attendance. Head resident positions in the residence halls are sometimes available through the university Housing Manager.

State Graduate Fellowships are available from the California State Scholarship and Loan Commission, 714 P Street, Sacramento 95814. Information about these awards, which pay tuition and required fees, and application forms may be obtained from the Commission or from the Financial Aids Office or the Director of Research. Applicants for awards must be residents of California and in need of assistance. The application deadline is generally mid-January for the following academic year.

ALAN PATTEE SCHOLARSHIP

Surviving children, natural or adopted, of California peace officers or firemen killed in the line of duty are not charged fees or tuition of any kind while enrolled at any campus of the California State University and Colleges, according to the Alan Pattee Scholarship Act and *Education Code*, Section 23762. Students qualifying for these benefits are known as Alan Pattee scholars.

TEACHING ASSISTANTSHIPS

Teaching assistantships are faculty appointments on a limited basis. A few departments may have openings on occasion. For further information, or to make application, a student should consult the chairman of the department in which he seeks the assistantship.

GRADUATE ASSISTANTSHIPS

There are a limited number of appointments as graduate assistants available to outstanding graduate students who are working on graduate degree programs. The pay varies with the assignment and the duration of the appointment. Interested applicants should consult the chairman of the department in which degree study is being taken.

STUDENT ASSISTANTS

Most departments throughout the university employ graduate and undergraduate students to assist faculty members with various instructional activities. Rates of pay, on an hourly basis, vary according to the types of work performed. A graduate student wishing to be considered for such work should apply directly to the chairman of the department in which he seeks employment.

NONRESIDENT TUITION FEE WAIVER

California school district employees who are not yet legal residents of California may be exempted from the nonresident tuition fee if they are provisionally certificated and if they are working toward fulfilling regular California credential requirements or completing a fifth year of study.

Children or spouses of California State University and Colleges academic or administrative employees are also eligible to apply for exemption from the nonresident fee.

ENROLLMENT PRIORITIES

Departments with high graduate enrollments may assign priorities to students wishing to enroll in graduate-level courses. Applicants for a master's degree who are in the last quarter of residence have first priority; other classified

graduate and post-baccalaureate students, degree or credential, have second priority; conditional and unclassified graduate and post-baccalaureate students have third priority. Nonobjective unclassified graduate students are admitted on a space-available basis.

MASTER'S DEGREES AND CREDENTIALS OFFERED

All graduate study in the university is under the general direction of the Dean of Graduate Studies. The advanced programs are the products of the faculties of the academic schools and the Teacher Preparation Center. The graduate programs offered at the university are as follows:

Master of Architecture
Master of Science in Biological Sciences
Master of Business Administration
Master of Science in Business Administration
Master of Science in Chemistry
Standard Teaching Credential—Elementary Specialization
Standard Teaching Credential—Secondary Specialization
Master of Science in Economics
Master of Arts in Education
Master of Engineering
Master of Arts in English
Master of Landscape Architecture
Master of Science in Mathematics
Master of Science in Physical Education
Master of Urban Planning

ARCHITECTURE

Master of Architecture

In the Department of Architecture, School of Environmental Design

J. Ingraham Clark, *Acting Chairman*

Architecture Graduate Studies Committee

J. Ingraham Clark, *Chairman*
Stuart O. Baesel
Richard Chylinski

The program leading to the Master of Architecture degree, the primary professional degree in architecture, affords a broad range of professional study requiring a high level of competency and scholastic achievement. Candidates selected for graduate study must have exhibited outstanding performance and accomplishment at the undergraduate level. An applicant not qualifying for regular admission may be admitted conditionally; he will be required to take additional course work at the graduate level beyond normal degree requirements. A full-time student who enters the program from an architecture background can complete his course of study in two academic years. This normally constitutes the minimum time required for graduation.

Planned primarily as the concluding two-year professional component to follow the four-year Bachelor of Science in Architecture curriculum in the total six-year program, the graduate program in architecture also provides courses of study for graduates holding the five-year Bachelor of Architecture degree. In addition, applicants with undergraduate degrees in fields other than architecture may be accepted as graduate students; somewhat extended programs of study leading to the Master of Architecture degree will be designed to build on their previous academic experience.

A candidate for the Master of Architecture degree will have the opportunity to choose from such areas of specialization as architectural design, urban design, architectural industrialization and technology, architectural administration, and architectural construction administration. A recommended list of electives will be offered for each area of specialization from elective courses within the School of Environmental Design as well as from other graduate programs and schools of the university.

Admission to the Program

An applicant for admission to this program must have received a baccalaureate degree composed of courses which are generally comparable to those contained in the undergraduate environmental design major at this university.

A student with a reasonable equivalent of this university's undergraduate program will be in a position to complete the required graduate work earlier than the student lacking adequate background in fundamental subject areas, who will be required first to compensate

for any deficiencies in his background by completing appropriate collateral courses. Consequently, a student will be admitted in conditional status until a time determined by the department graduate advisory committee. The conditions will be specified at the time of admission.

An undergraduate grade point average of 2.8, or an undergraduate grade point average of 2.5 to 2.79 with a 3.0 grade point average in all architectural upper division work is required for admission to the program with classified standing. A student not meeting these standards may be admitted with conditions if space is available. He must meet the stipulations of his conditional admission within the specified time. The conditions under which he is admitted will be specified in writing at the time of admission. As a general rule, he will be expected to complete at least ten quarter units of graduate course work with a 3.0 or better average before requesting classification. Inlcuded must be ARC 511, Architectural Design, which requires a B grade for successful completion. All applicants must have approval of the department graduate studies committee for admission.

Student Program

The nature and complexity of the tasks which confront the architect make it paramount that the master's program be broadly based and diversified. Reasonable flexibility is provided to structure each student's program of study in accordance with expressed interests and demonstrated capabilities. Essentially, master's degree candidates are afforded concentrated education in depth so that they can prepare themselves for significant professional involvement in the environmental design field as practitioners, teachers, researchers, or in other more specialized areas.

A thorough mastery of this broad field requires that a graduate student attain a basic understanding of design methodology, the relevant technologies, the cultural and economic factors in design, as well as ethical and operational aspects of architectural practice. While a clear comprehension of these subjects is essential, the architect must also understand their interrelationships and must demonstrate competence in their application through physical design activity.

Following admission, the student and his advisory committee will complete a master's degree program which lists all courses and other requirements which the student must fulfill to earn the degree. Selection of all elective courses must be with the approval of the advisory committee. The program must meet the general requirements for the degree, as specified below. The curriculum specified in the program may be altered only by written petition. Such a petition must be submitted by the student and approved by the department graduate studies commiteee, the department chairman and verified by the graduate dean, in that order.

Requirements

1. At least 90 quarter units of graduate work must be completed in the graduate degree program; of these, at least 45 units must be at the graduate level. None may be below the 400 level to receive graduate credit, and 400-level courses must be approved by the student's advisory committee and the department chairman.

2. A student holding the Bachelor of Architecture degree may substitute work completed in the fifth year for work in this program which it parallels. He must complete no less than 45 units of acceptable graduate credit at this university. All such substitutions shall be approved by the department graduate studies committee and the department chairman.
3. No more than 9 quarter units of graduate credit earned at other accredited institutions may be used toward the degree. That is, a minimum of 81 units must be completed in residence at this college except as provided above.
4. A grade point average of B (3.0) or better must be maintained in all courses taken to satisfy degree requirements and in all graded courses attempted at this university as a graduate student.

Curriculum

Required Courses

		Units
ARC 511	Architectural Design	4
ARC 512	Architectural Design	4
ARC 513	Architectural Design	4
ARC 531	Architectural Administration	4
ARC 532	Architectural Administration	4
ARC 533	Architectural Administration	4
ARC 561	Architectural Seminar	2
ARC 562	Architectural Seminar	2
ARC 563	Architectural Seminar	2
ARC 611	Architectural Design	6
ARC 612	Architectural Design	6
ARC 613	Architectural Design	6
ARC 661	Architectural Seminar	2
ARC 662	Architectural Seminar	2
ARC 663	Architectural Seminar	2
ARC 691	Directed Study	1-3
ARC 695 or 696	Project or Thesis	1-3
		60

Electives

Elective courses to complete the degree program will be selected with the approval of the student's adviser and related to particular areas of specialization.

BIOLOGICAL SCIENCES

Master of Science in Biological Sciences

In the Department of Biological Sciences, School of Science

Jerome E. Dimitman, *Chairman*

Departmental Graduate Committee

Martin F. Stoner, *Chairman*, Microbiology
Ronald S. Daniel, Biology
Don C. Force, Zoology
Brigitte H. Goehler, Microbiology
George W. Martinek, Biology
Raymond Z. Riznyk, Botany
Fred Shafia, Microbiology
Lazlo J. Szijj, Zoology

The Master of Science degree program in the Biological Sciences will enhance the knowledge and competence of the candidate in his field of specialization as well as develop his potential for continuing self-directed study and research. The curriculum is planned to provide theoretical, technical, and practical studies which will increase the student's knowledge of his discipline, educate him in research techniques, and promote his familiarity with and critical evaluation and use of the scientific literature. Graduate study specializations may be elected in the disciplines of the Biological Sciences: biology, botany, microbiology, and zoology.

ADMISSION TO THE PROGRAM

Applicants for admission to this program must have a bachelor's degree with a major in one of the disciplines of the biological sciences or a bachelor's degree in a related field with 45 quarter units of upper division courses in biological sciences. These courses must be comparable to those required for a baccalaureate major at this university.

An undergraduate grade point average of 2.5 or better with a 3.0 average in all upper division work is required for admission to the master's degree program in biological sciences. An applicant not meeting these standards may be admitted on condition with the approval of the departmental graduate committee. He must gain the committee's approval to be admitted to the degree program by meeting the requirements of his conditional admission in the time stipulated.

The student with his advisory committee will develop a program in his selected discipline of biology based upon his interests and preparation. The student's approved program will include required core courses, a selection of additional formal courses in a specialization, independent study, and an appropriate thesis. It will normally constitute 45 to 50 quarter units of credit.

To be advanced to candidacy for a master's degree in this department, a student must apply to the departmental graduate committee through his major professor. When the student's candidacy has been approved by the departmental graduate committee, he will be notified in writing by the Dean of Graduate Studies.

Requirements

1. The degree program must include a minimum of 45 quarter units, including no more than 9 acceptable units transferred from another graduate institution. No more than 21 units may be in approved 400-level courses.
2. All requirements specified by the university and by the student's thesis committee must be met.
3. The student must complete his program based upon the curriculum outlined below.
4. An acceptable thesis must be completed and a final copy submitted for binding in accordance with university regulations.
5. A final oral examination must be successfully completed.

Curriculum

Required Courses

	Units
Seminar in Biology (BIO 680)	3
Research in Biological Sciences (BIO 690)	6
Thesis (BIO 696)	3
	12

Courses in a Specialization

To be selected with consent of the student's thesis committee from 500 and 600-level courses, 33-38 units with not to exceed 21 units of approved 400-level courses.

Total 45-50

BUSINESS ADMINISTRATION

Master of Business Administration

In the School of Business Administration

Gilbert J. McKee, Jr., *Graduate Program Coordinator*

Graduate Programs Committee

Gilbert J. McKee, Jr., *Chairman*, Business Management
Frederick G. Cutler, Marketing Management
Michael M. Holland, F.I.R.E.
Koichiro Isshiki, Data Processing
William Thiesman, Accounting

The Master of Business Administration curriculum is designed to provide a two-year program of broad professional development. The objectives are to develop a better understanding of the role of the professional manager and his responsibilities within the firm and society; to assist the student in developing a critical approach to decision making and the ability to speak and write effectively and professionally; to develop skill in interpersonal relations; to develop a sound theoretical understanding of organizations and a management perspective for considering problems and making decisions from the viewpoint of the entire firm, industry, and economy; to develop an increased understanding and awareness of the world in which he lives; and to give him the capability of acquiring additional education by himself.

Admission to the Program and Requirements

After a prospective student has submitted his application for admission to the MBA program to the Office of Admissions, the procedure will be as follows:

1. Admission to the MBA program will be granted on recommendation of the School of Business Administration Graduate Programs Committee to the school dean. Selection will be on the basis of evidence of ability to perform at a high academic level. Minimum requirements for admission to the program are a 2.7 GPA in undergraduate courses completed for a bachelor's degree from an accredited college or university or a minimum score of 475 on the Admission Test for Graduate Study in Business. Exceptions may be granted on petition of the applicant, recommendation of the Graduate Programs Committee and approval by the school dean.
2. The Dean of the School of Business Administration will notify applicants of their selection or rejection.
3. The Graduate Programs Coordinator will serve as adviser to all selected applicants.
4. First year program courses may be waived if equivalent courses have been successfully completed by the student. Waiver will be granted on recommendation of the student's graduate adviser and approval of the Graduate Programs Committee.

5. Transfer credits not exceeding nine quarter units completed in a graduate school of an accredited college or university may be accepted for second year program courses or their equivalents upon recommendation of the graduate adviser and approval of the Graduate Programs Committee.
6. An advisory program study worksheet for the guidance of the student will be prepared by the Graduate Programs Coordinator when the student is admitted to the MBA degree program. An official degree program will be finalized prior to the student's advancement to candidacy. It will be prepared by the Graduate Programs Coordinator in consultation with the student, and approved by the Dean of the School of Business Administration and the Dean of Graduate Studies.
7. A grade-point average of B (3.0) or better must be maintained in all course work taken to satisfy degree requirements and in all graduate-level course work taken at this university.
8. Students will be required to show proficiency in elementary calculus prior to enrolling in second-year program courses by completing a course or courses in differential and integral calculus.

Curriculum

First Year

		Units
GBA 510	Managerial Accounting	3
GBA 511	Managerial Accounting	3
GBA 515	Marketing Concepts	3
GBA 516	Marketing Decisions in Business Administration	3
GBA 520	Automated Business Information Systems	3
GBA 521	Systems Analysis and Design	3
GBA 525	Managerial Finance	3
GBA 526	Advanced Managerial Finance	3
GBA 530	Legal Environment of Business	3
GBA 531	Management and Organizational Theory	3
GBA 532	Business Statistics and Probability	3
GBA 533	Management Policies	3
GBA 534	Introduction to Quantitative Methods in Business	3
EC 510	Economic Analysis and Policy	3
EC 511	Economic Analysis and Policy	3
	Total, First Year	45

Second Year

GBA 551	Accounting for Executive Administration	3
GBA 561	Seminar in Organization Theory	3
GBA 564	Quantitative Business Analysis	3
GBA 571	Marketing Strategies	3
GBA 581	Corporation Financial Planning	3
HST 610	History of American Business	3
GBA 643	Management Information Systems	3
GBA 651	Seminar in Marketing	3
GBA 662	Corporation Financial Evaluation Seminar	3
GBA 671	Management Seminar	3
GBA 691	Directed Comprehensive Studies	3
GBA 695a	Business Research Project	
	or	
GBA 695b	Field Analysis of the Firm	3
	or	
GBA 696	Thesis	

At Least Nine Units From:

ACC 401	Advanced Accounting	4
ACC 402	Advanced Accounting	4
ACC 403	Advanced Accounting	4
ACC 413	Case Studies in Controllership	4
ACC 424	Internal Operational Auditing and Systems	4
ACC 432	Federal Tax	3
ACC 443	Internship in Auditing	3
ACC 475	CPA Law Problems	3
ACC 476	CPA Auditing Problems	3
ACC 477	CPA Practice Problems and Theory	6
FIN 401	Security Analysis and Management	4
FIN 403	Real Property Evaluation	4
FIN 412	Real Property Analysis	4
FIN 414	Social Insurance and Pension Plans	4
FIN 415	Risk Management Seminar	4
FIN 416	Legal Aspects of Real Estate	4
BUS 417	Laws of Estate and Trust	4
MKT 408	Marketing Research	5
MKT 414	International Marketing	4
MKT 419	Legal Environments of Marketing	4
DP 431	Comparative Programming Languages	4
DP 444	Advanced Computer Concepts	4
DP 453	Data Communications	4
EC 423	Economic Conditions Analysis	3
GBA 563	Executive Development	3
GBA 568	Programming for Business Systems	3
GBA 582	Management of Financial Institutions	3
GBA 617	Industrial Dynamics	3
GBA 626	Instructional Development in Higher Education for Business	3
GBA 627	Communications in Management	3
GBA 631	Management of Marketing Channels	3
GBA 633	Marketing information and Communication Systems	3
GBA 635	Motivation and Marketing Behavior	3
GBA 645	Methods in Operations Analysis	3
GBA 655	Security and Portfolio Management	3
GBA 659	Seminar in Current Accounting Theory	3
GBA 675	Theory of the Firm	3
GBA 694	Accounting Research	3

Total, Second Year 45

Master of Science in Business Administration

In the School of Business Administration

The Master of Science degree in Business Administration with an option in business education is intended primarily for individuals with an interest in teaching business subjects in secondary schools, junior colleges, or four-year colleges. The objectives of the program are to develop an understanding of the role and scope of business education and its relationship to the total educational program; to develop the ability to read, interpret, and conduct research in business education; to prepare students for secondary, junior college, and college positions as professional classroom teachers, supervisors of instruction, and department heads; to prepare students to teach in or supervise a business education program in a business college, an adult education school, or in the training department of a business firm; and to provide the necessary background for doctoral study and for continued, self-directed study.

Admission to the Program

1. To be admitted to the Master of Science program an applicant shall have a bachelor's degree with a major in business or business education from an accredited college or university; an undergraduate grade-point average of 2.7 or higher, or a minimum score of 475 on the Admission Test for Graduate Study in Business (ATGSB); and acceptance by the Graduate Programs Committee of the School of Business Administration. Exceptions to these requirements may be granted on petition of the applicant, recommendation of the Graduate Programs Committee, and approval by the dean.
2. The Dean of the School of Business Administration will notify applicants of their selection or rejection by the School of Business Administration Graduate Programs Committee.
3. The Graduate Programs Coordinator will serve as adviser to all selected applicants.
4. Applicants who meet all admission requirements will enter as classified students and are eligible for filing the official degree program immediately. Students admitted on an unclassified basis will prepare the official program when they apply for classified standing, which must be done by the time the student has completed nine quarter units of courses in the program. On recommendation of the graudate adviser and approval of the Graduate Programs Committee and the Dean of the School of Business Administration, the official program will be submitted to the Graduate Division.

Requirements

1. The degree program must include a minimum of 45 quarter units. Transfer credits not exceeding nine quarter units completed in a graduate school of an accredited college or university may be accepted upon recommendation of the graduate adviser and approval of the Graduate Programs Committee. No more than 15 units of approved 400-level courses may apply toward the degree.

2. A grade point average of "B" (3.0) or better must be maintained in all course work taken to satisfy the degree requirements and in all graduate-level course work taken at this university.

CURRICULUM

The program of study for a candidate for the Master of Science degree in Business Administration will consist of 12 required units and 33 approved elective units. At least 18 elective units must be selected from Group A. No more than 15 units of approved 400-level courses may apply toward the 45 units required for the degree.

Required Courses

GBA 540	Foundations of Business Education	3
GBA 541	Review of Research in Business Education	3
GBA 550	Seminar in Business Education	3
GBA 695a	Business Research Project (or)	3
GBA 696	Thesis	3
	Total	12

Elective Courses--Group A

BUS 403	Records Management	3
GBA 542	Problems in Business Education	3
GBA 543	Innovations and Trends in Business Education	3
GBA 691	Directed Study in Business	1-3
HST 610	History of American Business	3
GBA 551	Accounting for Executive Administration	3
GBA 561	Organization Theory	3
GBA 564	Quanitative Business Analysis	3
GBA 571	Marketing Strategies	3
GBA 581	Corporation Financial Planning	3
GBA 626	Instructional Development in Higher Education for Business	3
GBA 627	Communications in Management	3
GBA 643	Management Information Systems	3
	Total Group A	18 to 33

Elective Courses--Group B

With the consent of the graduate adviser, up to 15 units may be selected from approved 400, 500, and 600-level courses in business, economics or teacher preparation.

CHEMISTRY

Master of Science in Chemistry

In the Department of Chemistry, School of Science

Vasu Dev, *Chairman*

Graduate Program Committee

J. Ernest Simpson, *Chairman,* Organic Chemistry
Charles E. Bowen, Biochemistry
David A. Haner, Chemical Physics
Yu-Ping Hsia, Physical Chemistry

The purpose of the Master of Science degree in Chemistry is to provide a comprehensive understanding of the principles of chemistry and application in detail to advanced problems. This understanding will be gained through course work, seminars, independent study, and research. The program is designed to provide the student with the necessary skills and techniques to reach his particular objective, whether it be for a successful career in teaching or industry or to pursue further graduate work. The student in this program may pursue one of several fields of specialization which include analytical, inorganic, organic, and physical chemistry, and biochemistry.

Admission to the Program

An applicant for admission to the graduate program in chemistry must have received a baccalaureate degree in chemistry or in a related discipline, including at least 36 quarter units of chemistry courses. An applicant lacking these qualifications may be admitted subject to a review of his academic background by the departmental graduate program committee. Admission to the program requires an undergraduate grade point average of 2.5 and an average of 3.0 in chemistry courses. A limited number of students not meeting these requirements may be admitted in conditional status if facilities permit. Such students must meet requirements stipulated in the statement of conditional admission within the time limit specified to remain in the university.

Each selected applicant with his advisory committee will design a program in his selected area of specialization based upon his interests, preparation, and performance on a departmental placement examination. The program will include required courses, a selection of courses in an area of specialization, independent study, and a thesis. It will normally constitute 45 to 50 quarter units of credit.

In order to be advanced to candidacy for a Master of Science degree in Chemistry, the student must meet all of the general requirements specified in this Bulletin. He must also perform satisfactorily on departmental examinations, at entrance, on reexamination, or by completion of specified courses.

Requirements

1. The degree program must include a minimum of 45 quarter units, including no more than 9 acceptable units transferred from another graduate institution. No more than 21 units may be in approved 400-level courses.
2. The student must complete his program based upon the curriculum outlined below.
3. The student must demonstrate a reading knowledge of a modern foreign language or proficiency in a computer programming language acceptable to the Chemistry Department.
4. An acceptable thesis must be completed and the necessary copies submitted in accordance with university regulations.
5. A final comprehensive examination must be successfully completed.

Curriculum

Required Courses

		Units
CHM 550	Seminar in Chemistry (Not more than 3 units of seminar may be included in the 45-unit minimum.)	3
CHM 696	Research and Thesis	9
	Courses in an area of Specialization	8

Select 6 units in a 2-quarter sequence in an area of specialization, to be selected from CHM 521, 522 (theoretical); CHM 541, 542 (organic); CHM 553, 554 (physical); CHM 561, 562 (biochemistry); CHM 571, 572 (inorganic); or CHM 581, 582 (analytical). Each of these courses requires a concurrent enrollment in 1 unit of CHM 513, Independent Study.

Approved electives	25
Total minimum	45

CREDENTIAL PROGRAMS

Standard Teaching Credential with Elementary and Secondary Specializations

In the Teacher Preparation Center

Dorothy M. Tucker, *Director*

California teaching credentials are certification objectives of university curricula just as baccalaureate and master's degrees are. Graduate students admitted to a program leading to university recommendation for a teaching credential are accorded classified status parallel to that of master's degree candidates.

The university is accredited by the State Board of Education to recommend qualified students for the Standard Teaching Credential with Elementary Specialization and the Standard Teaching Credential with Secondary Specialization. Information on admission and course requirements for the standard teaching credentials is available from the Director of the Teacher Preparation Center and from members of the college-wide Teacher Education Advisory Committeee. Members of this committee act as departmental advisers to credential students.

Teacher Preparation Center

Teacher preparation is a university-wide function. The Teacher Preparation Center serves as the university-wide planning and coordinating office for all teaching credential programs. Faculty members from all schools have a role to play in meeting teacher preparation objectives. The members of the university-wide Teacher Education Advisory Committee represent the departments offering credential majors and minors. The functions of this committee are:

1. To advise teacher education staff on matters relating to their respective areas.
2. To advise on changes and alterations in education programs.
3. To interpret and implement the university's education program to their departments.
4. To recommend to the director on instructional matters, student teaching, public relations and school district relations.

Credential Majors and Minors

The prospective elementary or secondary teacher must choose a major and a teaching minor (not required in 1973-74) from among the following:

ELEMENTARY MAJORS

Biological Sciences	Music
Humanities	Physical Sciences
Mathematics	Social Sciences

ELEMENTARY MINORS

Art	History
Biological Sciences	Home Economics
Chemistry	Mathematics
Earth Science	Music
Economics	Physical Education
English	Physics
Ethnic Studies	Politicsl Science
Geography	

SECONDARY MAJORS

Agricultural Sciences
Vocational Agriculture
Biological Sciences
Business Education
Chemistry
Communicaitn Arts (Journalism)
Communication Arts (Speech)
English
History
Home Economics
Language Arts (Drama)
Mathematics
Music
Physical Education
Physics
Political Science

SECONDARY MINORS

Agricultural Sciences
Art
Biological Sciences
Business Education
Chemistry
Dance
Drama
Economics
English
Ethnic Studies
History
Home Economics
Journalism
Mathematics
Music
Physical Education
Physics
Political Science
Speech

VOCATIONAL EDUCATION

The university program in vocational education is planned to include agriculture, business, home economics, and technology. At present, only vocational agriculture and home economics education are being offered. For details regarding requirements in vocational agriculture or home economics education, confer with the appropriate vocational education coordinator in the School of Agriculture. Information on credential requirements may be obtained in the Teacher Preparation Center.

Requirements

The following courses are required to gain university recommendation for the Standard Teaching Credential, elementary or secondary specialization.

		El	Sec
TEP 301	Principles of Education	3	3
TEP 401	Teaching Minority Group Children (recommended)	4	4
TEP 410	Psychological Foundations of Education	4	4
TEP 420	Elementary School Practices and Procedures	4	
TEP 421	Elementary School Instruction and Learning Analysis	4	
TEP 426	Foundations of Reading Instruction	4	
TEP 430	Student Teaching	12	
TEP 431	Student Teaching		12
TEP 432	Seminar	"3	
TEP 503	Curriculum Procedures and Methods		6
TEP 504	Seminar		3
TEP 505	Philosophical-Sociological Foundations of Education	4	4
		38	32

Admission to Candidacy

Admission to the university is not equivalent to being accepted into the teacher preparation program. A candidate for a teaching credential is selected through a three-step process involving university-wide teacher education committees, which supervise the teacher preparation program, review the qualifications of the candidate, and decide whether or not the candidate should be admitted to the program.

A candidate for a teaching credential must be granted approval by the teacher education committees to enter the teacher preparation program, to participate in student teaching, and to receive a recommendation for the credential. Detailed information is available at the Teacher Preparation Center.

New Credential Requirements

All credential candidates who will be freshmen, sophomores, or juniors on July 1, 1973 must meet the provisions of the Teacher Preparation and Licensing Law of 1970. Check with the Teacher Preparation Center for further information.

All students following the credential programs described in this bulletin must complete all work for the credential by September 15, 1974.

ECONOMICS

Master of Science in Economics

In the Department of Economics

Gertrude C. Boland, *Chairman*

The purposes of the program leading to a Master of Science degree in economics are (1) the preparation of economists qualified for immediate employment by business and government; (2) the preparation of economists for research positions in fields such as public administration, labor organization, finance, insurance and marketing; (3) the preparation of teachers of economics at the secondary school and community college level; (4) the enhancing of the competence of those students who wish to pursue advanced graduate work in economics. Graduate study specialization may be elected in any of the following areas: managerial economics and operations research; economic planning and development; quanitative economics; international economics; money and capital markets; industrial organization and public policy; urban and regional economics.

Admission to the Program

An applicant for admission to this program must hold a bachelor's degree from an accredited college or university and satisfy university and departmental requirements for admission to graduate study. An applicant holding a bachelor's degree in a field other than economics or who does not meet admission criteria may apply for admission as a conditional graduate student. The conditions will be stated in writing at the time of admission and will specify the amount of time allowed to meet entrance conditions. In his undergraduate work, the applicant must have maintained a grade point average of 3.0 or better in economics courses and a grade point average of 2.7 overall. All applicants for admission to the program are required to take the Graduate Record Examination Aptitude Test and the Advanced Economics Test. Admission to the graduate program in economics requires that the applicant be accepted by the Department of Economics.

Requirements

A minimum of 45 quarter units are required for the Master of Science degree in economics. All students must take 16 units of required core courses and complete a thesis. Courses for the balance of the 45 quarter units are selected by the individual student in his area of interest or specialization with the advice and consent of his faculty adviser(s).

No more than nine quarter units of acceptable credit may be transferred from another graduate institution. A maximum of 21 units may be taken in approved upper-division courses.

Curriculum

	Units
Required Courses	**16**
EC 550 Microeconomic Analysis (4)	
EC 551 Macroeconomic Analysis (4)	
EC 552, 553 Econometrics (4,4)	
Thesis	**9**
EC 696 Thesis (1-3)	
Field of Specialization	**8**
Electives	**12**
Total	**45**

EDUCATION

Master of Arts in Education

In the Teacher Preparation Center

Dorothy M. Tucker, *Director*

Education Graduate Committee

Rodman F. Garrity, *Chairman*

The Master of Arts in Education at Cal Poly, Pomona is planned to enhance the teaching competencies of people who hold a valid California elementary teaching credential. It will be a continuation at a higher level of the university's undergraduate programs presently supplying curricula for elementary teaching credentials.

The curriculum for each graduate student will be an individual one based upon individual needs. It will consist of work in subject areas, as well as professional course work. Specialization in reading is presently offered in this program. Plans are being made to offer additional specializations in the future. They will be announced in succeeding issues of this Bulletin. The Master of Arts in Education with a specialization in reading, in addition to the basic educational and research objectives of graduate study, will prepare students as specialists in reading and will assist them in qualifying for the certificate as Specialist Teacher in Reading under the Miller-Unruh Basic Reading Act of 1965. Methods courses and student teaching may not be applied to the master's degree. This means that in most cases, a credential seeker will have a program totaling a minimum of four post-graduate quarters.

Admission to the Program

An applicant for this program must possess a credential authorizing public school teaching or have been admitted to such a program at this university. The applicant must also hold a bachelor's degree from an accredited institution. Admission to the program requires an undergraduate grade point average of 2.5 or better and an average of 3.0 or better in Education and TEP courses taken as an undergraduate student.

Applicants who do not meet the minimum criteria but who show compensating strengths may be admitted conditionally by action of the Education Graduate Committee. Students admitted in this category must meet the stiuplations at admission within the time specified in the statement of conditional admission.

Each student admitted to the program in classified standing will prepare a formal degree program in consultation with his adviser prior to or immediately after the beginning of his first quarter of enrollment. Accepted applicants are advised to obtain a copy of the Handbook for Graduate Students in Education available in the Teacher Preparation Center.

Requirements

1. A minimum of 45 quarter units of acceptable graduate level work must be completed in the program; at least 24 quarter units must be at the 500 and 600 level (graduate). All 400-level courses accepted for master's degree credit will be specified by the Education Graduate Committee.
2. A grade-point average of 3.0 or better must be maintained in all courses included in the degree program as well as in all courses attempted while in graduate or post-baccalaureate standing at this university to satisfy the requirements for the Master of Arts in Education.
3. Completion of all requirements for a California teaching credential is required prior to the granting of the degree of Master of Arts in Education.
4. A thesis or project must be satisfactorily completed and defended by the candidate.

Curriculum

The program is a flexible curriculum requiring a minimum of 45 units, organized as follows: 15 quarter hours in core courses, 18 quarter hours in an area of specialization, and 12 quarter hours of electives. The student will be encouraged to take courses in other disciplines that relate to his needs in developing his program leading to the master's degree.

Required Courses		Units
TEP 650	Seminar in Current Problems and Strategies in Education	2-3
TEP 688	Methods and Techniques of Research	3
TEP 691	Independent Study	1-3
TEP 695	Project	1-6
	or	
TEP 696	Thesis	1-6
		15

Specialization Courses

A minimum of 18 units will be selected from an area of specialization. At present, only a specialization in reading is offered.

READING

TEP 520	Diagnosis of Reading Difficulties	3
TEP 521	Analysis of Corrective Reading Practices and Techniques	3
TEP 522	Laboratory of Clinical Practice: Treatment of Reading Disorders	3

Nine units selected with approval of the student's adviser.

Electives

To complete the minimum of 45 units, students will select courses from the elective list or from other upper-division or graduate courses approved by the Education Graduate Committee.

ENGINEERING

Master of Engineering

In the School of Engineering

Henry M. Clanton, *Graduate Studies Coordinator*

Engineering Graduate Studies Committee

Henry M. Clanton, Chairman
C. James Barr
Charles E. Cartmill
Joseph W. McKinley
P. Ramalingam
Robert R. Schneider

The School of Engineering offers an interdisciplinary graduate program leading to the Master of Engineering degree which, coupled with a bachelor's degree, will provide the student with a comprehensive preparation for entry into the engineering profession.

The program is designed to accept students with diverse undergraduate engineering backgrounds. A candidate for the Master of Engineering degree will have the opportunity to choose from three emphasis areas, Electrical and Electronic Systems, Structural Systems, and Environmental Systems, and will complete a course of study tailored to his individual talents and professional goals. The course of study will feature breadth supplemental to his undergraduate education as well as courses designed to increase his general engineering competency and to emphasize a technical area of his choice.

Admission to the Program

An applicant for admission to this program must meet university criteria as specified in the Admission, Registration, and Credit section of this bulletin as well as the criteria outlined below. Applicants are advised that a reasonable proficiency in computer languages is necessary for successful completion of this program. If the student is deficient in this area, he will be expected to remove the deficiency early in his program.

UNCONDITIONAL ADMISSION

An applicant who meets the requirements of this section will be admitted to the university and to this program with classified standing. Such status will be granted upon recommendation of the engineering graduate studies coordinator and approval by the Dean of Engineering.

The applicant must hold a baccalaureate degree in engineering from an accredited institution or, holding a baccalaureate degree not in engineering, shall have completed equivalent and acceptable academic preparation, as determined by the engineering graduate studies committee with the approval of the Dean of Engineering. He must have attained a GPA of 2.5 in upper division courses of his undergraduate degree and 3.0 for courses completed with graduate standing.

CONDITIONAL ADMISSION

An applicant admitted to the university who does not meet the criteria for admission with classified standing may be admitted to this program with specified conditions upon recommendation of the engineering graduate studies coordinator and approval of the Dean of Engineering.

When an applicant is admitted conditionally, the conditions are stated in the letter of admission. This statement will specify the conditions to be met and the time allowed for meeting them. If the conditions are satisfactorily met, the student will be accorded full classified standing. If the conditions are not met, the student will be disqualified from the program and not be permitted to reenroll as a graduate student in this university.

Scholastic Requirements

GRADUATE COURSES TAKEN BY UNDERGRADUATES

A senior with an upper division GPA of 2.5 may petition through his major department to use units of his senior year load as graduate credit provided the following conditions are met:

1. The adviser has endorsed the request.
2. Neither the courses involved nor the credit for them is needed to complete requirements for the baccalaureate degree.
3. The courses are at the 300, 400 or 500 level.

If approved, these credits will apply to graduate objectives, as appropriate, and will be recorded on the student's permanent record as graduate credit. Approval of the petition does not constitute acceptance of the courses toward the master's degree unless and until a degree program including such courses has been approved by the engineering graduate studies committee.

ADVANCEMENT TO CANDIDACY

In order to be advanced to candidacy for a Master of Engineering degree, the student must meet the requirements of the university as specified in this bulletin and apply through his graduate adviser. Approval will be granted by the Dean of Engineering upon the recommendation of the student's graduate adviser and the engineering graduate studies coordinator.

ADMISSION TO CLASSES

In some cases, class sizes are limited or multiple sections are not possible because of lack of faculty or facilities. If it is necessary to limit enrollment in graduate level courses in engineering (EGR 500 and 600 series), students will be admitted in the following priority order: (1) advanced to candidacy for the Master of Engineering degree; (2) fully classified (6360); (3) conditionally classified (8360); (4) post-baccalaureate without degree objective (8100); (5) undergraduates permitted to enroll in 500-level courses. A student enrolled in a master's degree program other than engineering will be given appropriate priority by request through his adviser.

GENERAL REQUIREMENTS

General requirements for master's degrees are stated in the Graduate Scholastic Requirements section of the bulletin.

After the student has been admitted to the program, a graduate adviser will be appointed. With the adviser's help, a degree program will be derived for the student and submitted for approval to the engineering graduate studies coordinator. The program will list all courses and requirements which the student must fulfill to earn the degree. Any deficiencies in fundamental subject areas will require prerequisite courses.

A minimum of 45 quarter units will be required, with a minimum of 24 quarter units of 500 or 600 level courses. Transfer credits not exceeding 9 quarter units completed in graduate standing at an accredited college or university may be accepted upon recommendation of the graduate adviser and approval of the engineering graduate studies coordinator.

Curriculum

1. A minimum of 20 quarter units will be selected to meet the breadth requirement, which will be composed of 20 quarter units chosen from 400 and 500 level courses. Of these 20 units, a minimum of 4 units will be in mathematics, science, or engineering analysis (EGR 510, 511, 512, 513, 515, and 540). The specific courses required of a given student will be determined according to the nature of his undergraduate program of study. Breadth will be insured by a combination of broadly based courses, e.g., mathematics and science, and by courses from engineering disciplines other than that in which the student majored as an undergraduate.
2. A minimum of 8 quarter units will be selected in one of the following emphasis areas:

   Electrical and Electronic Systems
   The electrical and electronic systems emphasis area includes courses in electronics, computer logic, control and communications systems, and network synthesis.

   Structural Systems
   The structural systems emphasis area includes courses in applied mechanics, structural design, vibration analysis, and elasticity.

   Environmental Systems (to be offered in 1974-75)
   The environmental systems emphasis area will include courses in water resources, air pollution, waste disposal and environmental control.

3. Approximately ten quarter units will be devoted to electives, affording the student opportunity to develop personal interests. Students will be encouraged to take elective courses outside the School of Engineering.
4. All candidates will be required to take

   EGR 695 — Master's Degree Project
   or
   EGR 696 — Master's Degree Thesis

   The maximum allowable credit for this category will be nine units.
5. The student should consult with his adviser and the professor in charge of each course to determine whether his previous coursework has provided the prerequisite information for that course.

UPPER-DIVISION COURSES

The following engineering courses are considered by the department concerned to be suitable for graduate credit. Credit toward the Master of Engineering degree will be given only upon approval

of the student's program by the graduate studies committee. Graduate credit for an undergraduate student will be given only upon petition in advance. Other upper division engineering courses and upper division courses at the University may be granted graduate credit upon petition in advance.

ARO 404
ARO 407
ARO 408
ARO 409
ARO 410
ARO 418
ARO 526
ARO 431
ARO 435
ARO 444
ARO 445

CHE 401
CHE 402
CHE 403
CHE 421
CHE 422
CHE 432
CHE 471

CE 421
CE 423
CE 427
CE 429
CE 431
CE 432
CE 433
CE 434
CE 437
CE 442
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CE 456

EEE 402
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EEE 451

IE 405
IE 415
IE 416
IE 417
IE 419
IE 429

ME 408
ME 411
ME 412
ME 414
ME 417
ME 418
ME 438
ME 439

MTE 424
MTE 427
MTE 431
MTE 451

ENGLISH

Master of Arts in English

In the Department of English and Modern Languages, School of Arts

James M. Ware, *Chairman*

Graduate Committee

John F. Fulbeck, *Chairman*
Stanley J. Cook
Harold P. Levitt
Joseph H. Stodder
Lillian Wilds

The primary objective of the Master of Arts program in English is to develop in the student a critical understanding of literature beyond the undergraduate level by cultivating in him an ability, through close reading of the literary text, to appreciate its form and explain the interrelationships of its part in the whole. Professionally, the program is designed to prepare competent English teachers for junior college and high school, and students who wish to proceed immediately to doctoral work.

Admission to the Program

For admission as a classified student in the MA program, the applicant should present a well-balanced undergraduate program—one that includes work in all the major periods, American literature, Shakespeare, Chaucer, literary criticism, and the English language. Deficiencies in any of these areas will be made up by course work; however, at the discretion of the chairman of the departmental graduate committee, a portion of such work may count toward the 45 units required for the degree. The student's grade point average in the upper division English courses of his undergraduate program must be at least 3.0. A student who does not meet these requirements may request special consideration for admission as a conditional student.

Admission to candidacy in the master's degree program in English will require the completion of at least fifteen quarter units of graduate work in English, in residence at this university, with an average grade of B; no grade below C will be accepted to meet this requirement.

Requirements and Curriculum

1. Course Work

The candidate will complete from 45 to 47 units as follows:

Required Courses—5-7 units

ENG 600 Techniques of Bibliography and Research 3
ENG 696 Master's Thesis 2-4

Alternate Requirements—18 units

In the following two-quarter sequences, the first quarter may be elected without the second. The student must show at least 3 units in each of Groups I, II, III and IV and elect two complete two-course sequences from different

groups—I, II, III, IV or V. Complete two-course sequences in literature should be of different periods, one sequence in prose works and the other in poetry.

Group I 3-6
ENG 651, 652 Studies in English Literature
a. to 1500
b. 1500-1660
c. 1660-1800
d. 19th Century
e. 20th Century

Group II 3-6
ENG 661, 662 Studies in American Literature
a. to 1800
b. 19th Century
c. 20th Century

Group III.....3-6
ENG 571, 572 Studies in Fiction
ENG 573, 574 Studies in Drama
ENG 575, 576 Studies in Poetry
ENG 577, 578 Studies in Non-fictional Prose

Group IV 3-6
ENG 581, 582 Studies in the English Language

Group V
ENG 585 The New Rhetoric in Theory and Practice 3
plus *either*
ENG 586 Problems in High School Composition.....3
or
ENG 588 Problems in College Freshman Composition 3

Elective Courses—22 units

These may include electives listed under Alternate Requirements above, and

ENG 550 English Seminar 1-3
ENG 570 Practical Criticism..... 3
ENG 580 Seminar in Creative Writing 1-4

ENG 587 The Teaching of Basic Language Skills 3
ENG 589 Developmental Reading in the Secondary School and Community College 3

A maximum of 8 units may be taken in fields related to English, chiefly philosophy, history, drama, communication arts, and the history of art.

2. Foreign Language

A candidate for the MA in English should be conversant with a foreign language. Normally, this means that level of achievement gained by two years of college study in the language. Variations of experience are such, however, that no single statement can be made. All candidates, therefore, are requested to consult with their advisers about the foreign language requirement.

3. Thesis

Requirements for the degree include the completion of a satisfactory thesis—scholarly, critical or creative.

LANDSCAPE ARCHITECTURE

Master of Landscape Architecture

In the Department of Landscape Architecture, School of Environmental Design

Cameron Man, *Chairman*

Landscape Architecture Graduate Studies Committee

John Lyle, *Chairman* Chester-Volski

The Department of Landscape Architecture welcomes graduate students from a variety of academic disciplines who are concerned with the shaping of our physical environment. This program is designed to provide the environment and the resources for learning the best and most advanced approaches and methods for establishing strong, clearly-defined, and mutually life-sustaining and enhancing relationships between man and the land, along with the other organic systems that it supports. The curriculum emphasizes case study projects at scales varying from the garden to the region with frequent review, discussion, and seminar sessions.

Upon completion of the program, a student will have developed sufficient comprehension of landscape design, environmental planning, plant associations, and landscape technology to enable him to communicate effectively with experts in the key specialized areas of landscape architecture and related disciplines. He will also have acquired a professional level of skill in one or more of these areas for application in practice. To meet these objectives, the curriculum offers a balance of required and elective courses for a broad base and specialized concentration. The number of course options, combined with opportunities for individual directed effort, provides varied directions for professional development. In general the student is advised to follow a direction that will effectively utilize his previous education.

Students with degrees in disciplines other than environmental design must take either the introductory concentrated design and graphics course (ENV 510) offered during the summer, or equivalent undergraduate courses, before proceeding with regular graduate course work.

In most cases, this course, along with other preparatory courses, will fulfill the minor emphasis area requirement for those students. Completion of the degree requirements will usually take at least six quarters in residence for the student with an undergraduate degree in environmental design and at least eight quarters for others.

Admission to the Program

Admission to the Master of Landscape Architecture program as a classified graduate student requires an undergraduate grade point average of 3.0 or better. An applicant with an average between 2.5 and 3.0 will be considered for

admission on a conditional basis if he can demonstrate compensating qualifications. In April the Graduate Studies Committee will select those candidates who will be admitted for the following summer or fall on the basis of their demonstrated ability.

Following admission, the student and his advisory committee will plan a program of study which lists all courses and other requirements which the student must fulfill for the degree. The curriculum specified in the program may be altered only by written petition, which shall be submitted in accordance with university regulations.

Following admission, the student and his advisory committee will plan a program of study which lists all courses and other requirements which the student must fulfill for the degree. The curriculum specified in the program may be altered only by written petition. Such a petition must be submitted by the student and approved by the advisory committee and the department head.

Requirements

1. At least 72 quarter units of graduate work must be completed in the graduate degree program; of these, at least 50 units must be at the graduate level. Upper division courses in elective and minor emphasis areas must be approved by the student's advisory committee and the department chairman for graduate credit. A minimum grade point average of 3.0 must be maintained in all courses taken to satisfy degree requirements as well as in all graded course work attempted while in graduate standing at this university.
2. Students with undergraduate degrees in landscape architecture will take a minimum of 12 units in a minor emphasis area. This area should be related to the student's professional direction and must be approved by the graduate adviser.
3. Students with degrees in disciplines other than environmental design and who do not have credit for equivalent courses must take the following prerequisite courses: ENV 510, ENV 513, LA 531, LA 541, and six units of environmental history.
4. Satisfactory completion of an examination, including, but not limited to, a defense of the thesis or project will be required of all students prior to the awarding of the degree. The examination will be conducted by the graduate advisory committee, but other faculty members may be invited to participate.

Curriculum

In consultation with his advisory committee, the student will select courses from the following list and approved electives to complete the 72-unit requirement for the Master of Landscape Architecture degree.

		Units
LA 512	Methods and Applications for Landscape Architecture	12
LA 513	Landscape and Human Habitat	6
LA 531	Landscape Construction and Design	6
LA 541	Landscape Planting	6
LA 551	Graduate Seminar	2
LA 601	Theory and Literature of Landscape Architecture	6
LA 602	Landscape Design and Natural Processes	6

LA 603 Landscape Design and Human Behavior 6
LA 604 Ecosystematic Landscape Design 6
LA 605 Design of the Humanized Landscape..... 6
LA 606 Environmental Analysis..... 6
LA 632 Landscape Technology 6
LA 642 Plant Ecology and Design 6
LA 652 Graduate Seminar 2
LA 691 Special Project 1
LA 692 Directed Research 2-6
LA 695 Project 2
LA 696 Thesis..... 4

MATHEMATICS

Master of Science in Mathematics

In the Department of Mathematics, School of Science

Sidney Birnbaum, *Chairman*

The university offers the degree of Master of Science in Mathematics to provide opportunities for advanced study to students whose background and interests focus on mathematical studies. Completion of this program will develop the student's knowledge and competence in mathematics and develop his ability to pursue advanced self-directed study in this field. A central curriculum, required of all candidates, provides a foundation for the study of recent developments in mathematics. Each student's degree program beyond the requirements will be planned to further his plans to pursue a career in applied fields of mathematics, in teaching, or in more advanced study leading to the doctorate.

Admission to the Program

An applicant for admission to this program should have completed a baccalaureate degree program in mathematics comparable to that offered at this university or a baccalaureate degree in a related field with at least 16 quarter units of upper division courses including MAT 314 and MAT 417 or their equivalent. Students whose undergraduate degree is in a field other than mathematics will generally find it necessary to follow a program of additional preparation before undertaking graduate work in mathematics. An upper division grade-point average in mathematics of at least 3.0 is required for admission as a classified graduate student in mathematics. Each applicant will be considered by the departmental graduate committee and recommended for admission on the basis of all evidence applicable to his admission. An applicant not meeting the minimum standards of the department may be admitted as a conditional student if space is available. He must comply with the conditions under which he is admitted within the time stipulated.

Student Program

The student's study list will be based upon his undergraduate preparation, his current interests in mathematics, and his occupational and professional goals. During the first quarter of residence, each classified graduate student will prepare a study list in consultation with his major professor. This will define all courses and other requirements which the student must fulfill to earn the degree. Once approved by the School of Science and verified by the Graduate Division, the study list may be amended only by petition, as outlined in the appropriate sections of the *Bulletin*.

Requirements

1. At least 45 units of acceptable graduate work must be completed in the master's degree program. At least 24 units of this credit shall be in courses at the graduate level.

2. No more than 9 units of graduate credit earned at other accredited institutions or in extension may be applied to degree requirements.
3. At least 27 units of credit toward the degree shall be completed after the student has been approved for advancement to candidacy.
4. A grade-point average of B (3.0) or better shall be maintained in all course work taken to satisfy the degree requirements.

Curriculum

REQUIRED COURSES

	Units
MAT 511, 512 Real Analysis	8
MAT 517, 518 Abstract Algebra	8
MAT 550 Seminar in Mathematics	6
MAT 695 Project	3
	25

ELECTIVES

One graduate course sequence in mathematics	8
Additional electives from	
1. Graduate courses in mathematics	
2. Senior level courses in mathematics not to exceed 8 units	
3. Up to two courses from approved graduate offerings of other departments	12
Total	45

PHYSICAL EDUCATION

Master of Science in Physical Education

In the Department of Physical Education, School of Arts

Don Warhurst, *Chairman*

Physical Education Graduate Committee

V. B. Anooshian, *Chairman*
Stanley Bassin
L. Lynne Emery
Otto F. W. Gasser
Frank D. Lansford
Mary Jo Oliver
Arthur Ridgway
Magnus Syverson
Leo Teghtmeyer

The Master of Science in Physical Education curriculum is planned to provide the student with an opportunity to improve his professional competencies within his chosen area of specialization. Experiences will be provided to enhance the analytical and critical tools for research and decision making. Historical and philosophical study will provide the student with a frame of reference that will aid in understanding today's problems in the profession.

A candidate for the master's degree in physical education will be required to choose among three areas of specialization: behavioral science of human performance, the scientific bases of physical education, or the organization and administration of physical education. The behavioral sciences specialization is directed to the needs of the teacher in a school situation. It is descriptive in nature and emphasizes causes of and methods for coping with today's problems. The scientific bases specialization provides an experimental approach to problems in physical education. Objectives of the program include the preparation of students for research and advanced graduate programs. The specialization in organization and administration of physical education is planned to prepare students for positions as athletic directors, department heads, or supervisors of health and physical education programs. Opportunity is provided for selection of elective courses within the department as well as from other graduate programs.

Admission to the Program

An applicant for admission to this program must have received a baccalaureate degree in physical education or a related discipline from an accredited institution. A candidate with a baccalaureate degree in a major other than physical education may be admitted subject to review of his academic background and performance by the departmental graduate studies committee.

An undergraduate grade point average of 3.0 or better, or an undergraduate grade point average of 2.5 or better with a 3.0 grade point average in all upper division-work is required for admission. An applicant not meeting these admission criteria will be reviewed by the

Physical Education Graduate Committee. If the committee accepts the applicant, he will be admitted conditionally.

The conditions, including the time allowed for meeting them, will be stated in writing at the time the applicant is admitted to the university. One condition will be completion of PE 590, Research Methods, with a grade of A or B. All applicants must have approval of the departmental graduate studies committee.

Each selected applicant will be assigned a Physical Education Department adviser. This assignment will be based upon the student's area of specialization and his thesis topic so that the adviser's expertise will coincide with the student's academic emphasis. The student, with his adviser, will develop a program based on his interests and preparation. This program will include required core courses, area of specialization courses and appropriate elective courses. All programs will be reviewed and approved by the departmental graduate studies committee.

A student may petition for advancement to candidacy when he has completed three graduate courses in the Department of Physical Education.

Requirements

1. The degree program must include a minimum of 45 quarter units, including no more than 9 acceptable units transferred from another graduate institution. No more than 18 units may be in approved upper-division courses. An overall 3.0 grade point average in all graduate work attempted is required.
2. The candidate must successfully pass a comprehensive oral examination dealing with required core areas and an intensive section relating to the candidate's area of specialization. This examination will be administered by the graduate faculty after the candidate has completed his core requirements and with approval of his adviser.
3. An acceptable thesis must be completed and approved by the candidate's thesis committee. Where appropriate, oral defense of the thesis will be required.

Curriculum

REQUIRED COURSES

		Units
PE 510	Philosophical Bases of Physical Education	3
PE 590	Research Methods	3
PE 650	Problems in Physical Education	3
PE 696	Thesis	9
		18

SPECIALIZATION COURSES

Behavioral Science of Human Performance

PE 540	Cultural Patterns and Physical Education	3
PE 640	Socio-Cultural Aspects of Sport	3
PE 643	World History of Physical Education	3
		9

Scientific Bases of Physical Education

PE 580	Advanced Motor Learning and Human Performance	3
	or	
PE 583	Advanced Motor Development	3

PE 680 Advanced Kinesiological Analysis 4
PE 683 Advanced Physiology of Exercise 4

11

Organization and Administration of Physical Education

PE 550 Problems of Administration in Physical Education 3
PE 553 Curriculum Development in Physical Education 3
PE 653 Supervision of Physical Education 3

9

ELECTIVES

Elective courses to complete the required minimum of 45 units must be selected. Electives must have approval of the student's adviser.

A list of electives, which includes upper division and graduate courses in related disciplines, is available in the adviser's office.

URBAN PLANNING

Master of Urban Planning

In the Department of Urban Planning, School of Environmental Design

Harry A. Anthony, *Chairman*

Urban Planning Graduate Studies Committee

Harry A. Anthony, *Chairman*
David E. Bess
John M. Ducey
Frank A. Ducote
Sherman W. Griselle
Stephen A. Kaufman
Harvey Steinberg

Graduate study in the Department of Urban Planning leads to the degree Master of Urban Planning. The two-year curriculum is designed to provide instruction combined with supporting studies, seminars, and studio projects integrated with "real world" field work. Both the theoretical and the applied aspects of urban planning are pursued. The work is directed toward competent professional development and prepares the student to meet present and probable future needs of the planning profession. Holders of the Master of Urban Planning degree will be qualified for employment in city, county, regional, and state planning departments; national planning, housing, and urban development agencies; other public organizations, foundations, industries, and private architectural, engineering, and planning consulting firms. They will also be able to work as urban planning consultants in the public and the private sector following prerequisite work experience; teach urban planning at junior college, college, and agency levels (in-service training programs) following some additional preparation and practical experience; and undertake further post-graduate study leading to a doctoral degree.

Admission to the Program

An undergraduate grade point average of 3.0 or better, or an undergraduate grade point average of 2.5 or better with satisfactory performance on the aptitude test of the Graduate Record Examination is required for admission to the degree program. The departmental graduate studies committee may approve admission on a conditional basis for applicants not meeting these qualifications but exhibiting promise of successfully engaging in graduate work.

A bachelor's degree in urban planning (or city and regional planning) is the best preparation for this program of graduate studies. However, an applicant with a bachelor's degree in architecture, landscape architecture, civil engineering, or another discipline relevant to urban planning, such as economics, sociology, political science or public administration, is also welcome.

Following his admission, the student and his graduate adviser prepare a program which lists all courses and other requirements which the student must fulfill to earn the master's degree. Each student's detailed program is composed to fit his particular needs and profes-

sional goals. Selection of all elective courses must be approved by the student's adviser.

Requirements

1. Seventy-two quarter units of graduate work must normally be completed in the graduate degree program. While the length of the program is two years, exceptionally well qualified students, such as those with prior graduate education and/or significant professional experience, those coming from five-year undergraduate professional programs, and students with a Bachelor of Science degree in Urban Planning from the university, may complete the program with fewer units in less time. Certain courses may be waived by the chairman of the department or the departmental graduate studies committee based either on a special examination or on an evaluation of the student's prior education and/or professional experience.
2. No more than nine quarter units of graduate credit, graded "B" or better, earned at another accredited institution may be transferred toward second year requirements for the degree. No course below the 400 level will be accepted for graduate credit. A grade point average of "B" or better must be maintained in all graded course work attempted on graduate standing at this university and in all courses used to satisfy degree requirements. A grade of "B" or better must be earned in all Urban Planning courses taken at this university. No grade below "C" will be accepted for credit in any course applied to the master's degree.
3. Satisfactory completion (over a two- or three-consecutive-quarter period) and defense of a thesis or a terminal project are required of all students prior to the awarding of the degree. The examination is conducted by the departmental graduate studies committee. Other faculty members and planning professionals are, on occasion, invited to participate.

Curriculum

REQUIRED COURSES

		Units
*UP 431	General Plan Survey	4
*UP 432	General Plan Development	4
*UP 465	Urban Planning Implementation	4
*UP 511, 512	Urban Planning Theory & Practice	8
UP 534	Urban Housing and Community Development	4
UP 535	Urban Data and Stimulation Programs	4
UP 536	Urban Transportation & Circulation Systems	4
UP 537	Regional, State, and National Planning	4
UP 651	Planning in Contemporary Society	3
UP 652	Planning Administration & Professional Practice	3
UP 691	Urban Research Methods & Techniques	3
UP 695	Project	
	or	6
UP 696	Thesis	
		51
Approved Electives		21
		72

*Students with a bachelor's degree in Urban Planning (or city and/or regional planning) are not required to take these courses.

ELECTIVES

Elective courses to complete the required minimum of 72 units may be selected from any 400-, 500-, or 600-level course at this university with the approval of the student's adviser. The student should select a group of electives that will help him either to specialize in one area (e.g., urban design, social planning, housing and community development, urban economics, planning administration) or to broaden his background and acquire a wider area of competence.

Students with undergraduate degrees in fields other than urban planning, architecture, or landscape architecture, are required to include ENV 510, Environmental Design and Graphics, as an elective course, preferably during the first quarter of graduate study at this university.

DESCRIPTIONS OF GRADUATE COURSES

Agriculture

AG 550 Seminar in Agriculture (1-3)

Current findings and research problems in the field of agriculture and their application to the industry. Seminar, 1 to 3 hours. Maximum of six units may be earned.

Animal Science

*AS 512 Nutritional Energetics (4)

The biochemical, physiological, and nutritional functions of energy transformation involved in the formation of animal products. Lecture-discussion, 4 hours. Prerequisites: Monogastric or ruminant nutrition, physiology, and biochemistry, or permission of the instructor.

*AS 514 Population Genetics (3)

The population concept of genetics. The forces influencing gene frequencies in both equilibrium and dynamic populations; the development of breeding programs. Lecture, 3 hours. Prerequisited: AS 404 and BIO 411

*AS 545 Designed Analysis of Experimental Research (4)

Experimental statistics. Applications of statistical estimation and inference. Linear regression and correlation; analysis of variance for completely randomized design, randomized blocks, Latin squares, factorials and analysis of covariance. Concepts of design for experimantal investigations. Lecture-discussion, 3 hours, laboratory, 3 hours. Prerequisite: BIO 411. *Dr. Knight*

*AS 670 Animal Science Seminar (1)

Study of selected topics in animal science. Each seminar subtitled to describe its emphasis. Seminar, 1 hour. Prerequisite: Consent of professor.

*AS 690 Animal Science Research (1-4)

Individual research in area of specialization under direction of graduate faculty. May be repeated for a maximum of 12 units.

*AS 691 Directed Study (1)

Individual research in a specialized area under direction of major professor.

*AS 696 Thesis (1-3)

Compilation of data culminating in the summarizing and reporting, in thesis form, of an independent supervised research project. Prerequisite: AS 690

Architecture

ARC 511, 512, 513 Architectural Design (4) (4) (4)

After deciding upon his area of specialty, the student with his graduate advisory committee will select an area of study and develop a program and progress outline. Lecture-discussion, 1 hour, laboratory, 9 hours.

ARC 531, 532, 533 Architectural Administration (4) (4) (4)

Work experience in architectural offices under the direction of architects especially chosen to teach the aspects of professional practice to the student. Specific percentages of time will be devoted to contract drawings, client and consultant meetings, architectural administration, and supervision. 10 hours per week.

ARC 561, 562, 563 Architectural Seminar (2) (2) (2)

Seminar programs developed to discuss relevant environmental, planning, architectural, administrative, and technological issues. Seminar, 2 hours.

ARC 611, 612, 613 Architectural Design (6) (6) (6)

At the discretion of the graduate advisory committee, a student may continue his work from the fifth year or begin a new area of study for his sixth year. Lecture-discussion, 2 hours, laboratory, 12 hours.

*Not offered in 1973-74.

ARC 661, 662, 663 Architectural Seminar (2) (2) (2)

Seminar programs developed to discuss relevant environmental, planning, architectural, administrative, and technological issues. Seminar, 2 hours.

ARC 691 Directed Study (1-3)

Individual student research on a subject of critical importance to architecture. Maximum credit, 9 units.

ARC 695 Project (1-3)

Development of a terminal research project on a topic selected by the student, approved by the department, and submitted to the faculty. Maximum credit, 9 units.

ARC 696 Thesis (1-3)

Development of a terminal research report on a topic selected by the student, approved by the department, and submitted to the faculty. Approved, bound thesis filed in college library. Maximum credit, 9 units.

Biology

BIO 510 Cytogenetics (3)

Nuclear and cytoplasmic structures and phenomena as related to inheritance. Lecture-discussion, 2 hours, laboratory, 3 hours. Prerequisites: BIO 303 and BIO 423. *Dr. Martinek*

BIO 520 Endocrinology (4)

Study of the endocrine glands and their role in growth development, metabolic regulation, and reproduction in animals. Lecture-discussion, 3 hours, laboratory, 3 hours. Prerequisites: CHM 327, ZOO 324 and/or consent of instructor. *Dr. Gaston*

BIO 525 Ecology of Fungi (4)

Autecology and synecology of fungi in soil, water, atmosphere, living and dead tissues, and other environments; saprophytism, commensualism, mutualism, and parasitism; methods of collection, isolation, and ecological study; some independent study required. Lecture-discussion, 2 hours, laboratory, 6 hours. Prerequisite: BOT 425, BOT 426; BIO 325 or BOT 421 recommended; or consent of instructor. *Dr. Stoner, Dr. Dimitman*

BIO 530 Mechanisms of Speciation (3)

Principles and concepts of evolutionary mechanisms in plants and animals. Lecture-discussion, 3 hours. Prerequisites: BIO 213, BIO 303, BIO 325. *Dr. Szijj*

BIO 535 Advanced Call Biology (4)

Molecular, ultrastructural and functional approach to cell biology. Lecture-discussion, 4 hours. Prerequisites: BIO 435, CHM 327, or consent of instructor. *Dr. Wu*

BIO 540 Biogeography (3)

Principles and concepts of the distribution of plants and animals throughout the world. Origins and dispersal of modern floras and faunas as related to environmental and historical factors. Lecture-discussion, 3 hours. Prerequisites: BIO 213 and BIO 325. *Mr. Lint, Dr. Stewart, Dr. Szijj*

BIO 542 Graduate Laboratory (1-3)

Advanced laboratory experience, individually arranged or concurrent with other graduate courses. May be repeated for a maximum of 10 units. Prerequisite: Consent of instructor.

Bio 545 Physiology of Plant Disease (4)

Physiological bases of infectious and non-infectious plant diseases, including aspects of disease development and host-parasite interaction. Lecture-discussion, 2 hours, laboratory, 6 hours. Prerequisites: BOT 322, CHM 327, and PTH 223. *Dr. Stoner*

BIO 546 Mineral Nutrition of Plants (3)

Present day concepts of inorganic nutrition in plants, effects of hydrogen ion, deficiency and excess diseases, nitrogen, metabolism, photosynthesis; relationship of plant nutrition to animal nutrition. Lecture-discussion, 3 hours. Prerequisite: BOT 322. *Dr. Wu*

BIO 550 Plant Growth and Development (4)

Hormonal and Environmental control of plant morphogenesis. Lecture-discussion, 2 hours, laboratory, 6 hours. Prerequisite: BOT 322. *Dr. Blakeley*

BIO 555 Microbial Genetics (4)

Principles of heredity in micro-organisms with emphasis on bacterial and fungal systems. Lecture-discussion, 3 hours, laboratory, 3 hours. Prerequisite: MIC 432 or consent of instructor. *Dr. Martinek*

BIO 560 Bacterial Physiology (4)

Physiological characteristics of bacteria with emphasis upon growth, biosynthetic capabilities and regulation of enzyme formation and function. Lecture-discussion, 2 hours, laboratory, 6 hours. Prerequisites: MIC 432 and CHM 327. *Dr. Goehler*

BIO 565 Comparative Physiology (4)

Mechanisms of basic functions in the important animal phyla. Lecture-discussion, 3 hours, laboratory, 3 hours. Prerequisites: ZOO 324 and ZOO 326. *Dr. Knill*

BIO 570 Insect Physiology (4)

Functions of insect organs and organ systems. Lecture-discussion, 3 hours, laboratory, 3 hours. Prerequisites: CHM 327 and ENT 423. *Dr. Daniel*

BIO 575 Advanced Topics in Biology (2)

Discussion of advanced topics in biology. Topics selected to correspond to the changes in the field or needs of advanced students. Total credit limited to 6 units with a maximum of 2 units per quarter. Lecture-discussion, 2 hours.

BIO 576 Advanced Immunology (3)

Principles of immunoglobulin structure and of allotypy and other isoantigenic concepts. Laboratory exercises in the fractionation and purification of serum globulins and in their use to study cytoantigens. Lecture-discussion, 2 hours, laboratory, 3 hours. Prerequisite: MIC 415

BIO 577 Electron Microscope Techniques (3)

Techniques in biological electron microscopy, including preparation of tissues, shadowing, sectioning, operation of the transmission electron microscope and darkroom techniques. Material of particular interest to the student may be studied. Lecture-discussion, 2 hours, laboratory, 3 hours. Prerequisite: Consent of instructor.

BIO 590 Experimer Biology (3)

Lecture series concerni in selected fields of biology; each series to have a subtitle identifying the field. Lecture-discussion, 3 hours. Total credit limited to 9 units.

BIO 680 Seminar in Biology (1-3)

Arrangements to be made with faculty. Topics in disciplines of biology offered according to interests and needs of students. Each seminar to have a subtitle identifying the discipline. 1-3 units in one quarter, maximum of 9 units.

BIO 690 Research in Biological Sciences (1-2)

Selection and completion of a research project under supervision of faculty member. Total credit limited to 6 units with a maximum of 2 units per quarter. Laboratory, 6 hours.

BIO 691 Directed Study (1-3)

Independent study in an area chosen by the student under the supervision and direction of a graduate faculty member.

BIO 696 Thesis (1-3)

Compilation, evaluation, interpretation, and report of research for thesis. Completion of approved, bound thesis. Prerequisite: BIO 690

Business Administration

GBA 510 Managerial Accounting (3)

Accounting principles used in the collection, interpretation, and use of financial data from the standpoints of creditors, investors, and management. Lecture-discussion, 3 hours.

GBA 511 Managerial Accounting

Principles of financial analysis, costing concepts, the interpretation of costed data, and decision making. Lecture-discussion, 3 hours. Prerequisite: GBA 510

GBA 515 Marketing Concepts (3)

Marketing activities and structure. Development of markets, analysis of external and internal environments affecting market performance, forces of change and their influence on the firm's strategies and actions. Lecture-discussion, 3 hours.

GBA 516 Marketing Decisions in Business Administration (3)

Problems affecting the management of marketing effort. Development of marketing plans and programs, their execution and evaluation from the viewpoint of management and society. Lecture-discussion, 3 hours. Prerequisite: GBA 515

GBA 520 Automated Business Information Sytems (3)

Concepts of automated business information systems. The computer as an information processing system and as a business management tool. Management information programming. Lecture-discussion, 3 hours.

GBA 521 Systems Analysis and Design (3)

Business information systems from a "total systems" concept. Investigation of information gathering, analysis, design, and implementation of information systems. Alternative approaches to solution of practical management problems. Lecture-discussion, 3 hours. Prerequisite: GBA 520

GBA 525 Managerial Finance (3)

Short and long term sources of finance for a business. Internal control of assets and financial evaluation of managerial planning and capital expenditures. Lecture-discussion, 3 hours. Prerequisite: GBA 511

GBA 526 Advanced Managerial Finance (3)

Quantitative financial problem solving through application of capital budgeting theory, cost of capital theory and treatment of uncertainty. Lecture discussion, 3 hours. Prerequisites: GBA 525 and 532

GBA 530 Legal Environment of Business (3)

Essential legal aspects of the business environment. Legal systems and procedures, enforceable agreements, agency, bailments, and bankruptcy. Case studies. Lecture-discussion, 3 hours.

GBA 531 Management and Organizational Theory (3)

Development of theories of management and organization in the twentieth century. Managerial principles and functions and the utilization of these concepts. Case studies. Lecture-discussion, 3 hours.

GBA 532 Business Statistics and Probability (3)

Theory and application of probability and random variables, sampling, empirical and theoretical distributions, parametric and non-parametric tests, regression and correlation analysis in business problem solving. Lecture-discussion, 3 hours.

GBA 533 Management Policies (3)

An integration of functional areas of business in the approach to problem solving. Top management policy development and practices. Case studies. Lecture-discussion, 3 hours. Prerequisite: GBA 531

GBA 534 Introduction to Quantitative Methods in Business (3)

Quantitative concepts and methods in management decision making. Operations research, decision models, decision theory, and complex problem solving in dynamic systems. Lecture-discussion, 3 hours. Prerequisite: GBA 532

GBA 540 Foundations of Business Education (3)

Principles, philosophy, and history of business education. Principles of curriculum development and evaluation; the role and scope of business education and its relationship to the total educational program. Lecture-discussion, 3 hours.

GBA 541 Review of Research in Business Education (3)

Criteria for the evaluation of research in business education. Survey of methods employed in research; review and evaluation of reported research; areas of needed research. Lecture-discussion, 3 hours. Prerequisite: GBA 540

GBA 542 Problems in Business Education (3)

Special problems in selected areas of business education, including community relations, classroom equipment, personnel, in-service programs, and governmental regulation of programs. Lecture-discussion, 3 hours.

GBA 543 Innovations and Trends in Business Education (3)

Study of current trends and innovations in business education on the secondary and collegiate levels. Seminar discussions, demonstrations, observations. Seminar, 3 hours. Course may be taken in two different areas. Selection may be made from the following fields:

a. Bookkeeping and Accounting
b. Business-Economic Education
c. Data Processing for Teachers
d. Distributive Education
e. Office-Secretarial Subjects

GBA 550 Seminar in Business Education (3)

Identification and analysis of problems in the organization, administration, and teaching of business subjects in secondary schools. Current trends. Directed research. Seminar, 3 hours.

GBA 551 Accounting for Executive Administration (3)

Control systems, responsibility in profit planning and control, capital investment decisions, and federal income tax aspects of decisions. Lecture-discussion, 3 hours. Prerequisite: GBA 511

GBA 561 Seminar in Organization Theory (3)

Current research in organization dynamics and the influence of the behavioral sciences. Implications of this research to humanistic and quantitative models. Seminar, 3 hours. Prerequisite: GBA 533

GBA 563 Executive Development (3)

Problems and techniques in the development of personnel for management responsibility. Current practices of business in stimulating self-development. Seminar, 3 hours. Prerequisite: GBA 561

GBA 564 Quantitative Business Analysis (3)

Quantitative theory and techniques. Linear, integer, non-linear, and dynamic programming, queuing theory, Monte Carlo methods, game theory, Markov processes, simulation and the development of inventory models. Lecture-discussion, 3 hours. To be taken during first quarter of the second year of the MBA program. Prerequisite: GBA 534

GBA 568 Programming for Business Systems (3)

Programming the computer to maintain files and tables and to print statistical reports as used in commercial computer applications. Lecture-discussion, 3 hours. Prerequisites: GBA 521 and 534

GBA 571 Marketing Strategies (3)

Setting of objectives and goals for the performance of marketing functions. Development of strategies to reach these objectives. Seminar, 3 hours. Prerequisite: GBA 516

GBA 581 Corporation Financial Planning (3)

Financial implications of long-range corporate planning and the effect on profitability and liquidity of the firm. Case problems, model developing, and testing of various plans. Lecture-discussion, 3 hours. Prerequisite: GBA 526

GBA 582 Management of Financial Institutions (3)

Management problems of financial institutions, commercial banks, savings and loan associations, insurance companies and sales finance companies. Case studies. Lecture-discussion, 3 hours. Prerequisites: GBA 511 and 525

GBA 617 Industrial Dynamics (3)

Changing interaction of supervisors and employees within the social system of the plant. Resolution of problems and tensions through the communications process viewed as an administrative tool. The development of leadership and a realistic view of managerial hierarchy and power struggles. The strategy of planning and decision making. Lecture-discussion, 3 hours.

GBA 626 Instructional Development in Higher Education for Business (3)

An examination and appraisal of the development, scope, and diversity of schools of business administration, varieties of institutions, purposes, and programs; trends and current issues. Seminar, 3 hours.

GBA 627 Communications in Management (3)

Communications as a process in the management function. Development and improvement of advanced techniques of writing for business. Lecture-discussion, 3 hours.

GBA 631 Management of Marketing Channels (3)

Historical development, functions, and management of marketing channels. Channel relationships and funds. Lecture-discussion, 3 hours. Prerequisite: GBA 571

GBA 633 Marketing Information and Communications Systems (3)

Generation and analysis of marketing information. Research, theory and methods of market stimulation and mass communications. Use of marketing information in communications to the market and to channel members. Lecture-discussion, 3 hours. Prerequisite: GBA 571

GBA 635 Motivation and Market Behavior (3)

Significant theories and research contributions toward understanding consumer marketplace behavior. Applications of these findings to managerial decisions and policies in the areas of product, price, promotion and distribution. Lecture-discussion, 3 hours. Prerequisite: GBA 571

GBA 643 Management Information Systems (3)

Establishment and control of information flow, storage, and retrieval from a common data bank. Management tools in data communication and information retrieval. Use of automated computer systems. Lecture-discussion, 3 hours. Prerequisite: GBA 521

GBA 645 Methods in Operations Analysis (3)

Applications of electronic computers to management techniques. Formulating linear programming for use on a computer, simulation using FORTRAN, Simscript, or GPSS computer languages, random number generation; solving regression and sales forecasting problems on a computer. Lecture-discussion, 3 hours. Prerequisite: GBA 564 and 643

GBA 651 Seminar in Marketing (3)

Advanced theory, newest concepts and technical advances, current problems, and possible future developments in marketing. Seminar, 3 hours. Prerequisite: GBA 571

GBA 655 Security and Portfolio Management (3)

Analysis and evaluation of investment securities. Portfolio management of trust funds, pension plans, mutual funds and other institutional investors. Consideration of tax implications, institutional requirements and trustee regulations. Lecture-discussion, 3 hours. Prerequisites: GBA 511 and 525

GBA 659 Seminar in Current Accounting Theory (3)

Evolution of accounting theory. Emphasis on current problems, reasons, and causes for controversy, and future developments. Seminar, 3 hours. Prerequisite: GBA 551

GBA 662 Corporation Financial Evaluation Seminar (3)

Establishing the value of a going concern using quantitative, qualitative, and market analysis techniques, present value theory, quantitative models and methods applied to case studies on expansion acquisitions through mergers and tender offers. Case study. Lecture-discussion, 3 hours. Prerequisite: GBA 581

GBA 671 Management Seminar (3)

Business policy; analysis of alternatives; selection of appropriate courses of action, draws upon functional areas of business. Seminar, 3 hours. To be taken in last quarter of the MBA program. Prerequisite: GBA 561

GBA 675 Theory of the Firm (3)

Development of a model to predict behavior of business firms. Integration of functional areas and internal and external environments of the firm. Seminar, 3 hours. To be taken in last quarter of the MBA program. Prerequisite: GBA 561

GBA 691 Directed Study in Business (1-3)

Independent, directed study of advanced topics in the field. Individual conferences with the instructor.

GBA 692 Independent Study (1-3)

Individual investigation or original study to be conducted in a field of interest selected by the student with approval of the professor. Intensive personal research under initiative of the student with general guidance and advice from the professor. Seminar.

GBA 694 Accounting Research (3)

Application of selected theory concepts in model construction. The determination of changes in reported operating results arising from changes in accounting theory. Seminar, 3 hours. Prerequisite: GBA 564

GBA 695a Business Research Project (3)

A written research project concerning a significant problem in the field of business. Prerequisite: GBA 691 for all candidates. GBA 541 for MS Candidates.

GBA 695b Field Analysis of the Firm (3)

Team analysis of the power structure, communication networks, problems, objectives, and policies of a specific firm. Oral and written report. Field work and seminar. Prerequisite: GBA 691 for MBA candidates.

GBA 696 Thesis (3)

A formal thesis concerning a significant problem in the field of business. Prerequisite: GBA 691 for all candidates. GBA 541 for MS Candidates.

Chemistry

CHM 513 Independent Study in Advanced Chemistry (1-4)

Reading and reports on papers in the literature, solving of assigned problems. Minimum of 60 hours total time. Concurrent: Any of CHM 521, 522, 541, 542, 553, 554, 561, 562, 571, 572, 581, 582. May be repeated for a maximum of 7 units.

CHM 521, 522 Theoretical Chemistry (3) (3)

Quantum chemistry; applications of quantum mechanics to problems of atomic and molecular structure. Molecular orbital and valence bond theories; their applications and extensions. Electronic states and transitions. Organic and inorganic molecular structures and reaction mechanisms. Lecture-discussion 3 hours. Concurrent: CHM 513. *Dr. Hsia*

CHM 541, 542 Advances in Organic Chemistry (3) (3)

Modern synthetic organic chemistry with emphasis on reactions, reaction mechanisms, structure, structure determination, and stereochemistry of organic compounds. Selected topics from organic photochemical reactions and chemistry of organometallic, heterocyclic, organophosphorus, and organoboron compounds. Lecture-discussion, 3 hours. Concurrent: CHM 513. *Dr. Abernethy, Dr. Dev, Dr. Maya*

CHM 543 Chemistry of Heterocyclic Compounds (3)

Chemistry of organic compounds, having three, four, five, and six membered cyclic structure and containing one or more than one hereroatom. Lecture-discussion, 3 hours. *Dr. Vollmar*

CHM 544 Chemistry of Natural Products (3)

Isolation, structure elucidation and synthesis of naturally occurring compounds like alkaloids, carbohydrates, hormones, peptides, steroids, and terpenes. Lecture-discussion, 3 hours. *Dr. Simpson*

CHM 545 Organic Photochemistry (3)

Light-induced chemical reactions of organic compounds. The mechanism of photochemical reactions and applications to synthesis problems encountered in organic chemistry. Lecture-discussion, 3 hours. *Dr. Dev*

CHM 550 Seminar in Chemistry (1-3)

Special problems in selected areas of chemistry. Seminar, 1 to 3 hours.

CHM 553, 554 Advanced Physical Chemistry (3) (3)

Selected advanced topics in physical chemistry such as molecular spectra, optical activity, transport phenomena, dielectrics, elasticity and electrode processes. Lecture-discussion, 3 hours. Concurrent: CHM 513. *Dr. Hiemenz, Dr. Pye*

CHM 555 Molecular Spectroscopy (3)

Theory and application of electrical magnetic transition moments, transition probability, symmetry consideration involving the correlation of IR, UV, Raman and spin resonance spectra for molecular structure elucidation. Lecture-discussion, 3 hours. *Dr. Haner*

CHM 561, 562 Selected Topics in Biochemistry (3) (3)

Basic chemical principles as applied to topics of biochemical interest, for example,

cellular energetics and kinetics, analysis of the structure and function of proteins and other supermolecules, feedback control of metabolism, biochemical behavior of organelles. Lecture-discussion, 3 hours. Concurrent: CHM 513. *Dr. C. Bowen*

CHM 563 Enzymology (3)

The nature of enzymes including enzyme kinetics, mechanisms of enzyme catalyzed reactions, enzyme inhibitors, classification of enzymes. Lecture-discussion, 3 hours. *Dr. Rice*

CHM 564 Enzymology Laboratory (2)

Techniques for the isolation and characterization of enzymes from plant and animal sources. Kinetic studies, specificity, physical chemical properties. Laboratory, 6 hours. Concurrent: CHM 563. *Dr. Rice*

CHM 565 Biochemical Mechanisms (3)

General mechanistic principles of organic and inorganic chemistry as they relate to biochemistry. Lecture-discussion, 3 hours. *Dr. C. Bowen*

CHM 566 Biochemical Preparations (2)

Isolation of some eight different materials from plant and animal sources, such as a blood protein fraction, a plant nucleic acid, a plant terpene, a hormone preparation, a metabolic intermediate, and an urinary excretion product. Laboratory, 6 hours. *Dr. Abernethy*

CHM 567 Advanced Clinical Chemistry (3)

Chemical basis of recent advances in analytical methods and techniques, basis of new instrumentation, treatment of data, interpretations of clinical analyses. Lecture-discussion, 3 hours.

CHM 571, 572 Advanced Inorganic Chemistry (3) (3)

Chemical applications of group theory; bonding theories and their applications to the properties of inorganic compounds; inorganic reaction mechanisms; physical methods in inorganic chemistry. Lecture-discussion, 3 hours. Concurrent: CHM 513. *Dr. R. Bowen*

CHM 581, 582 Advances in Analytical Chemistry (3) (3)

Selected topics in modern analytical chemistry. Lecture-discussion, 3 hours. Concurrent: CHM 513. *Dr. Gutnikov*

CHM 691 Directed Study (1-2)

Independent study in an area chosen by the student under the supervision and direction of a graduate faculty member.

CHM 696 Thesis (1-3)

Compilation, evaluation, interpretation, and report of research for thesis. Completion of approved, bound thesis.

Economics

EC 510 Economic Analysis and Policy (3)

Microeconomic relationships in a market system. Behavior of individual economic units. Analysis and policy. Not open to students with prior courses in economics. Lecture-discussion, 3 hours.

EC 511 Economic Analysis and Policy (3)

Macroeconomic relationships in a market system. Determinants of aggregate economic activity. Analysis and policy. Lecture-discussion, 3 hours. Prerequisite: EC 510

EC 540 Seminar in Economics (1-3)

Special problems in selected areas of economics. Each seminar will be structured to meet the needs of individual students. Seminar, 1 to 3 hours.

EC 550 Microeconomic Analysis (4)

Analysis of the resources allocation systems and behavior of producing and consuming units. Lecture-discussion, 4 hours. Prerequisites: Some knowledge of elementary calculus and linear algebra; intermediate price theory (equivalent to EC 311); or consent of the instructor.

EC 551 Macroeconomic Analysis (4)

Analysis of aggregate national economic activities. Lecture-discussion, 4 hours. Prerequisites: Some knowledge of elementary calculus and linear algebra; intermediate income theory (equivalent to EC 312); or consent of the instructor.

EC 552, 553 Econometrics (4) (4)

Specification and statistical inference in econometric models; estimation, verification and prediction of economic variables; recent empirical studies, advanced topics in econometrics. Lecture-discussion, 4 hours. Pre-

requisites: Calculus and matrix algebra; intermediate price and income analysis; one year of statistics; or equivalent; or consent of instructor.

EC 560, 561 Managerial Economics and Operations Analysis (4) (4)

Advanced topics and new developments in managerial economics and operations research. Lecture-discussion, 4 hours. Prerequisites: Intermediate microeconomics, mathematical analysis (equivalent to Math 108, 109, 204), and statistics (equivalent to EC 321, 322); or consent of instructor.

EC 654, 655 International Economics (4) (4)

Advanced topics in international trade theory, liquidity and finance theory. Theory of tariffs. Problems of the International Monetary System. Lecture-discussion, 4 hours. Prerequisites: Intermediate Price and Income Theory and undergraduate Money and Banking.

EC 656, 657 Money and Capital Markets (4) (4)

Topics in monetary and capital theory. Liquidity creation, financial intermediation and capital formation. Development of capital policy. Lecture-discussion, 4 hours. Prerequisites: Intermediate Price and Income Theory and undergraduate Money and Banking.

EC 658 Industrial Organization and Public Policy (4)

The organization and structure of the American enterprise economy with special reference to manufacturing and processing industries. Corporate behavior, price policy and workability of competition in industries. Public policy towards monopoly and competition. Lecture-discussion, 4 hours. Prerequisite: EC 311 and 312 or consent of instructor.

EC 667, 668 Urban and Regional Economics (4) (4)

Economic analysis as applied to significant current regional and urban problems and policy. Demand and supply of urban public services transportation and locational decisions and urban land resource analysis. Lecture-discussion, 4 hours. Prerequisites: EC 324 and 432 and/or consent of instructor.

EC 691 Directed Study (1-2)

Independent study in an area chosen by the student under the supervision and direction of a graduate faculty member.

EC 696 Thesis (1-3)

Independent research and study under the supervision of the faculty. Reporting the research results in the approved form. Maximum credit, 9 units.

Education

Graduate courses in education are listed under Teacher Preparation.

Engineering

*EGR 510 Engineering Probability and Statistics (4)

Mean square estimation, introduction to stochastic processes, time averages and ergodicity, continuous testing and estimation, confidence intervals, significance, thermodynamics, machine design, systems analysis, and reliability. Lecture-discussion, 4 hours. Prerequisite: Undergraduate course in probability theory.

*EGR 511 Numerical Solutions of Engineering Problems (4)

Approximating functions, difference methods, matrices, iterative methods. Approximation methods for ordinary and partial differential equations. Applications to electrical networks, transport phenomena, structural systems, dynamical systems, etc. Lecture-discussion, 4 hours. Prerequisite: Mathematics equivalent to ECPD-accredited curriculum or consent of professor.

*EGR 512 Vector Analysis and Complex Variables (4)

Vector and scalar fields. Gradient, divergence curl. Green and Stokes theorems. Complex functions and conformal mapping. Applications in electrodynamics, heat transfer, fluid dynamics and aerodynamics. Lecture-discussion, 4 hours. Prerequisite: Mathematics equivalent to ECPD-accredited curriculum or consent of professor.

*EGR 513 Applied Transform Methods in Engineering (4)

Laplace and Fourier transform methods. Integral equations. Applications to electrical networks, vibrations, heat conduction, hydrodynamics and elasticity. Lecture-discussion, 4 hours. Prerequisite: Mathematics equivalent to ECPD-accredited curriculum or consent of professor.

*Not offered in 1973-74

EGR 515 Matrix Methods in Engineering (4)

Application of matrix methods in engineering analysis. Matrix algebra. Eigenvalues and eigenvectors. Energy techniques. Transformations. Applications in classical mechanics, analysis of structures, circuit analysis, vibrations, heat transfer and fluid dynamics. Lecture-discussion, 4 hours. Prerequisite: Mathematics equivalent to ECPD-accredited curriculum or consent of professor.

EGR 516 Advanced Indeterminate Structures (4)

Advanced topics in analysis of multi-degree of freedom systems by slope deflection and superposition of distribution process. Elements of matrix application including flexibility and stiffness methods. Deflection of continuous trusses and frames structures. Stability analysis of beam-column utilizing classical strain energy theorems. Lecture-discussion, 4 hours. Prerequisite: CE 305

EGR 517 Advanced Structural Design—Steel (4)

Advanced topics in structural steel analysis and design including long span and tapered gridders, orthotropic plates, spare frames. Column stability and post buckling states, secondary stresses. Design of lateral force resistant building frames. Plastic analysis and design of rigid frame structures. Lecture-discussion, 3 hours, laboratory, 3 hours. Prerequisite: Upper-division course in structural analysis.

EGR 518 Stability of Structures (4)

Advanced topics in stability of beam columns; elastic and inelastic buckling of straight columns; torsional buckling of bars; lateral buckling of beams; local buckling of plate elements; stability fo frames. Lecture-discussion, 4 hours. Prerequisite: EGR 511

EGR 519 Advanced Indeterminate Structures (4)

Advanced finite element techniques, stiffness method, numerical techniques; stability and non-linear analysis; plate and shell elements. Lecture-discussion, 4 hours. Prerequisite: EGR 515, 516

EGR 520 Elasticity (4)

Theory of stress and strain for continuous media. Stress-strain relations of elasticity. Plane stress and strain. Introduction to thermoelasticity. Lecture-discussion, 4 hours. Prerequisite: Consent of professor.

EGR 521 Structural Dynamics (4)

Concepts of the dynamics of elastic bodies. Longitudinal, transverse and torsional vibrations of structural elements. Vibrations of plates and shells. Approximate methods in dynamics of structures. Lecture-discussion, 4 hours. Prerequisite: Consent of professor.

EGR 522 Advanced Reinforced Concrete Design (4)

Advanced design and analysis of continuous building frames to include floor systems, eccentrically loaded columns, folded plate and shell roof elements. Retaining structures, footings subject to overturning, composite deck sections. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in design of reinforced structures.

EGR 523 Prestressed Concrete Design (4)

Design and analysis of prestressed concrete components including slabs, beams, and columns utilizing both elastic and ultimate strength design concepts; special problems involving composite design of structural systems. Lecture-discussion, 4 hours. Prerequisite: Upper division course in reinforced concrete design.

*EGR 524 Mathematical Modeling in Transport Phenomena (4)

The application of mathematical analysis to the solution of transport phenomena problems. Topics include modeling and closed form solutions of ordinary and partial differential equations. Lecture-discussion, 4 hours. Prerequisite: Consent of professor.

EGR 525 Foundation Engineering (3)

Advanced theories of soil bearing capacity and stress distribution of soils. Analysis and design of mat, pile and drilled caisson foundations involving advanced theories of foundation action. Design of foundations subjected to overturning forces and dynamic loads. Lecture-discussion 3 hours. Prerequisite: Consent of professor.

*Not offered in 1973-74

*EGR 526 Hydrodynamics (4)

Application of continuity, energy and momentum equations. Two- and three-dimensional potential flow; method of images. Conformal mapping; Schwarz-Christoffel transformation. Electroconductive analog. Navier-Stokes equations; some exact solutions. Boundary layer flows; pressure gradient. Laminar motion, transition and turbulent motion; cavitation. Introduction to unsteady flow. Introduction to non-Newtonian fluid mechanics. Lecutre-discussion, 4 hours. Prerequisite: Consent of professor.

EGR 527 Advanced Gas Dynamics (4)

Method of characteristics and applications; non-steady flows; the blunt body problem and curved shock waves; similarity rules; real gas results; Newtonian gas dynamics. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in gas dynamics.

*EGR 528 Hypersonic Aerodynamics (4)

Two- and three-dimensional flow fields. Hypersonic small disturbance and Newtonian impact theories and application. Boundary layer interaction with the inviscid flow field. Real gas phenomena. Blunt body and conical flow fields; minimum drag bodies; aerodynamic analysis of complete configurations. Lecture-discussion, 4 hours. Prerequisites: ARO 304, 404, or consent of professor.

*EGR 529 Nuclear Engineering (3)

Diffusion and slowing down of neutrons; steady state reactor theory; critical size, homogeneous and heterogeneous reactor systems. Control of nuclear reactors, reactor kinetics, reactor system analysis, transient behavior. Reactor operation; startup, scram, and shutdown. Lecture-discussion, 3 hours. Prerequisite: Six quarter units of upper division courses in nuclear engineering.

*EGR 530 Theory of Structural Plates and Shells (4)

Flexural theory of thin plates of various forms; stability of flat plates; small deflections of laterally loaded plates; effect of various edge restraints; optimum design of plate-type structures; general theory of thin shells involving stresses and deformation; stability analysis of thin shells; design of thin shell concrete roofs. Lecture-discussion, 4 hours. Prerequisite: EGR 511 and consent of professor.

EGR 531 Atmospheric Pollution Dynamics (4)

Shifting equilibrium, kinetics; rate constants, branching chain. Catalysis; rates, diffusion, mixing. Atmospheric environment; remote sensing, simulation, eddy diffusion. Coagulation of an aerosol. Atmospheric boundary layer: turbulence. Photochemical smog: chemical kinetics, modeling, simulation. Lecture-discussion, 4 hours. Prerequisites: Upper division course in atmospheric pollution, EGR 511, 535, or equivalents.

EGR 532 Conduction Heat Transfer (3)

Application of principles of heat transfer and thermodynamics in solution of steady-state, transient heat transfer problems. Classical heat conduction theory. Deriviation of Fourier field equation and integration of various single and multidimensional problems. Detailed discussion of thermal conductivity. Lecture-discussion, 3 hours. Prerequisite: Upper division course in heat transfer.

EGR 533 Mechanical Metallurgy (4)

Application of dislocation theory to mechanical behavior. Fundamental mechanisms of strain hardening. Creep and fatigue treated by the dislocation concept. Dislocation strengthening mechanisms involving point defects, solute atoms, and dispersed phases. High strain rate deformation as related to metal working operations. Lecture-discussion 4 hours. Prerequisite: Consent of professor.

*EGR 534 Fracture of Solids (4)

Engineering and microscopic approaches, fracture testing, nucleation and propagation of cleavage and shear cracks. Effect of notches, fracture of steels, creep and fatigue, stress corrosion cracking, and hydrogen embittlement. Lecture-discussion, 4 hours. Prerequisite: Consent of professor.

EGR 535 Advanced Fluid Dynamics (4)

Fluid stress and rate of strain relationships. Momentum and energy similarity parameters. Fluid turbulence. Free turbulent flows. Hydraulic flows. Lecture-discussion, 4 hours. Prerequisite: Upper division course in fluid mechanics or consent of professor.

*Not offered in 1973-74

EGR 536 Aerodynamics of Ground Transportation Systems (4)

Aerodynamics of high speed ground transportation vehicles; steady, unsteady flow. Analysis of vehicles in tubes; incompressible, compressible flow. Slender body aerodynamics: shielding effects, forces, moments. Ram wing: forces, moments, stability. Travel time reduction. Energy management. Drag: friction, interference. Lecture-discussion, 4 hours. Prerequisite: Upper division course in high speed surface transportation systems.

EGR 537 Boundary Layer Concepts (4)

Treatment of Newtonian and non-Newtonian fluids in the laminar and turbulent regimes. Positive and negative pressure gradients. Development of the thermal boundary layer. Some exact and inexact solutions. Wedge flow. Lecture-discussion, 4 hours. Prerequisite: EGR 535

EGR 538 Advanced Engineering Economy (4)

Engineering economic decision criteria and models for evaluating capital investment proposals and engineering projects. Replacement studies, risk and uncertainty, tax effects, intangibles, probabilistic models, computer techniques. Lecture-discussion, 4 hours. Prerequisite: Three quarter units of undergraduate engineering economy.

*EGR 539 Advanced Human Factors in Engineering Design (4)

Methods and research techniques in engineering design of optimum man-machine systems. Designing systems with the objective of developing optimum combinations of physical and human components. Effects of environment on human performance. Man-machine dynamics. Lecture-discussion, 4 hours. Prerequisite: Consent of professor.

EGR 540 Linear Systems (4)

Application of vector spaces and matrix theory to the representation and solution of systems in state-space. Introduction of the concepts of equilibrium and stability. Lecture-discussion, 4 hours. Prerequisite: Mathematics equivalent to ECPD-accredited curriculum or consent of professor.

*Not offered in 1973-74

EGR 541 Advanced Networks Analysis (4)

General analysis procedures for linear networks. Properties and limitations of linear networks. Lecturer-discussion, 4 hours. Prerequisite: Upper division course in networks analysis and EGR 540 or consent of professor.

EGR 542 Sampled-Data Control Systems (4)

Basic theory of sampling and quantizing, state-space and Z-transform representation. Time response stability and design using both classical and modern techniques. Lecture-discussion, 4 hours. Prerequisites: Upper-division course in control systems and EGR 540 or consent of professor.

EGR 543 Computer Architecture (4)

Digital computer organization and comparative architectural features; digital design languages as tools in establishing the engineering specifications leading to the systematic design of a digital logic system. Micro programming concepts and their influence on architecture and design. Lecture-discussion, 4 hours. Prerequisite: Upper division course in logic systems design or consent of professor.

EGR 544 Communication Theory (4)

Inofrmation theory for continuous and discrete channels. Signal detection and recognition, coding for optimal communication nets. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in communications systems.

EGR 545 Advanced Engineering Thermodynamics (4)

Development of concept of equilibrium. Reversible and irreversible principles of thermodynamics, second law consequences; estimation and correlation of thermodynamic properties. Physical basis of conservation equations. Statistical foundations. Lecture-discussion, 4 hours. Prerequisite: Upper division course in thermodynamics.

*EGR 546 Heterogeneous Phase Equilibria (4)

Applied phase equilibria. A development of theoretical and empirical principles for understanding complex multiphase behavior in multicomponent chemical systems. Lecture-discussion, 4 hours. Prerequisite: Consent of professor.

EGR 547 Separation Processes (4)

Design, cost and energy requirements for processes to remove pollutants from plant effluents. Topics include equilibrium processes, multistage processes, binary and multicomponent systems. Lecture-discussion, 4 hours. Prerequisite: Consent of professor.

EGR 548 Solid State Electronics (4)

Quantum theory and atomic structure. Classical and quantum statistics. Description of crystal structures. Lattic vibrations. Band theory of solids. Transport phenomena in semi-conductors and metals. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in solid-state electronics.

EGR 549 Advanced Methods in Operations Research (4)

Methodology of operations research and algorithms for system and subsystem optimization; emphasis on methods yielding practical numerical procedures. Linear programming and extensions, dynamic and integer programming, queuing theory, network analysis, game theory and decision theory. Lecture-discussion, 4 hours. Prerequisite: Six quarter units operations research, or consent of professor.

EGR 550 Advanced Transport Phenomena (4)

Differential balances for momentum, heat, and mass transfer are derived. Convective energy, mass, and momentum transfer; internal and external flow, exact and approximate solutions. Application for space vehicle re-entry, binary and multicomponent systems, nuclear reactor cooling, mass transfer and heat exchanger analysis. Lecture-discussion, 4 hours. Prerequisite: EGR 537 or consent of professor.

EGR 551 Logical Design of Finite State Machines (4)

Techniques for minimizing or decomposing combinational, sequential, and iterative circuits, finite state machine models, transition graphs, machine identification, decomposition, regular expressions, machine description, and lossless machines. Lecture-discussion, 4 hours. Prerequisite: Six quarter units of upper division logic systems design.

*Not offered in 1973-74

*EGR 552 Nonlinear Control Systems (4)

Numerical approximation methods in the solution of nonlinear systems. Phase-plane techniques including method of isoclines, delta, and analysis of singular points. Describing function techniques, perturbation reversion, variation of parameters and harmonic balance methods. Liapunov stability methods. Lecture-discussion, 4 hours. Prerequisites: Upper-division course in control systems and EGR 540 or consent of professor.

*EGR 553 Computer Simulation of Engineering Systems (4)

Systems theory as foundation for engineering analysis and synthesis of complex systems. Numerical methods and simulation models using digital computers. Optimization of engineering systems design and performance. Applications to engineering systems problems. Lecture-discussion, 4 hours. Prerequisite: Consent of professor.

EGR 554 Modern Algebra for Digital Systems (4)

Algebraic systems of groups, rings and Boolean algebras. Application of digital computer systems and data communication. Lecture-discussion, 4 hours. Prerequisite: Six quarter units of upper division logic systems design.

*EGR 555 Advanced Analytical Dynamics (3)

Lagrange's equations, Hamilton's principle, variational principles, equations of motion in Eulerian angle systems, characteristic equation of inertia matrix, cuspidal motion and notation. Lecture-discussion, 3 hours. Prerequisite: EGR 511

EGR 556 Advanced Mechanics of Materials (3)

Theories of failure, dynamic loading, unsymmetrical bending, shear center, curved beams, thick-walled cylinders, inelastic action (limit design), residual stresses, energy methods, repeated loading (fatigue), stress concentration. Lecture-discussion, 3 hours. Prerequisite: Consent of professor.

*EGR 557 Analysis of Mechanical Designs (3)

Analysis of common machine elements. Relation to design decision making. Optimization, reliability, miniaturization, and statistical strength theory. Lecture-discussion, 3 hours. Prerequisite: Upper division course in stress analysis.

*EGR 558 Solid State Electronics (4)

In-depth treatment of the physical principles and operational characteristics of advanced semiconductor devices; emphasis on current development and technology. Lecture-discussion, 4 hours. Prerequisite: EGR 548

*EGR 559 Applied Automata Theory (4)

The study of information processing systems as applied to digital computing systems and data communication. Lecture-discussion 4 hours. Prerequisite: Upper-division course in probability theory and EGR 554

EGR 560 Information Theory and Coding (4)

Channel models, coding theorems, coding systems, statistical properties of information sources. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in probability theory.

EGR 561 Computer-Aided Circuit Design (4)

Device modeling, numerical techniques for solving network equations in the frequency and time domains, design techniques using adjoint circuits, recent network design and analysis programs. Lecture-discussion, 4 hours. Prerequisite: EGR 541 or consent of professor.

EGR 599 Special Topics for Graduate Students (2-4)

Lecture-discussion of selected topics comprising new or experimental courses not otherwise offered. Each offering identified in the current schedule and on the student's transcript. Prerequisite: Consent of professor.

EGR 690 Engineering Seminar (3)

Topics in advanced engineering chosen according to the interests and needs of the students enrolled. Each seminar subtitled to describe its content. Seminar, 3 hours. Prerequisite: Classified standing and professor's approval. May be repeated for a maximum of 6 units.

EGR 691 Directed Study (1-3)

Analytical or laboratory investigation, under direction of a graduate faculty member, of selected engineering problems with emphasis on individual initiative in gathering and organizing data and reporting results. May be repeated.

EGR 695 Master's Degree Project (1-3)

Independent research resulting in a project. Credit assigned upon successful completion of a project approved for the master's degree. Open to classified graduate students advanced to candidacy for the degree. and with approval of the major professor. Maximum credit 9 units.

EGR 696 Master's Degree Thesis (1-3)

Independent research resulting in a thesis. Credit assigned upon successful completion of a thesis approved for the master's degree. Open to classified graduate students advanced to candidacy for the degree and with approval of the major professor. Maximum credit 9 units.

English

ENG 550 English Seminar (1-3)

Topics in advanced areas of language or literature. Seminar, 1 to 3 hours. Prerequisite: Instructor's approval. May be repeated for a total of 9 units.

ENG 570 Practical Criticism (3)

Practice in applying to works of various genres such modes of criticism as the formal, the historical, and the psychological. Seminar, 3 hours.

ENG 571, 572 Studies in Fiction (3) (3)

Selected authors and topics. In the first quarter, extensive reading. In the second, explication, by students, of selected texts; long paper. First quarter prerequisite to the second. Seminar, 3 hours.

*Not offered in 1973-74

ENG 573, 574 Studies in Drama (3) (3)

Selected authors and topics. In the first quarter, extensive reading. In the second, explication, by students, of selected texts; long paper. First quarter prerequisite to the second. Seminar, 3 hours.

ENG 575, 576 Studies in Poetry (3) (3)

Selected authors and topics. In the first quarter, extensive reading. In the second, explication, by studetns, of selected texts; long paper. First quarter prerequisite to the second. Seminar, 3 hours.

ENG 577, 578 Studies in Non-fictional Prose (3) (3)

Selected authors and topics. In the first quarter, extensive reading. In the second, explication, by students, of selected texts; long paper. First quarter prerequisite to the second. Seminar, 3 hours.

ENG 580 Seminar in Creative Writing (1-4)

Two genres: fiction and non-fiction or poetry and drama. Seminar, 1 to 4 hours. Prerequisite: Approval of submitted manuscript or permission of instructor.

ENG 581, 582 Studies in English Language (3) (3)

Such topics as language as a cultural force, literary tradition approached linguistically, stylistics and poetics, dialects and their social contexts. Seminar, 3 hours.

ENG 583 The Contemporary American Novel (3)

Structure and theme in the American novel since 1945. Such writers as Bellow, Capote, Malamud, Roth, Styron, Updike. Lecture-discussion, 3 hours.

ENG 585 The New Rhetoric in Theory and Practice (3)

Readings in I. A. Richards, Kenneth Burke, Francis Christensen, and others. Application of rhetorical principles to problems in writing. Stylistic analyses of contemporary expository prose. Seminar, 3 hours.

ENG 586 Problems in High School Composition (3)

Practices in the teaching of composition in secondary schools. Readings, observations and sample teaching under supervision. Seminar, 2 hours, field work. Prerequisite: ENG 585

ENG 587 The Teaching of Basic Language Skills (3)

Approaches to the problems of high school and community college students with serious deficiencies in language skills. Lecture-discussion, 3 hours. Prerequisite: Consent of the professor.

ENG 588 Problems in College Freshman Composition (3)

The instruction of composition in the community college classroom. Readings, observations and sample teaching under supervision. Seminar, 2 hours, field work. Prerequisite: ENG 585

ENG 589 Developmental Reading in the Secondary School and Community College (3)

Theory and practice in the development of effective reading by students who have mastered basic reading skills and can be helped to enrich vocabulary, improve comprehension and increase speed. Lecture-discussion, 3 hours. Prerequisite: consent of the professor.

ENG 600 Techniques of Bibliography and Research (3)

Principles, techniques, and materials relevant to the solution of problems in scholarly and critical investigation. Bibliographical sources and methods. Should be taken in the first quarter of the student's degree program. Lecture-discussion, 3 hours.

ENG 651, 652 Studies in English Literature (3) (3)

Selected authors and topics: (A) to 1500, (B) 1550-1660, (C) 1660-1800, (D) 19th Century, (E) 20th Century. In the first quarter, extensive reading. In the second, explication of selected texts; long paper. First quarter prerequisite to second. May be repeated with different content for additional credit. Seminar, 3 hours.

ENG 661, 662 Studies in American Literature (3) (3)

Selected authors and topics: (A) to 1800, (B) 19th Century, (C) 20th Century. In the first quarter, extensive reading. In the second, explicaiton of selected texts; long paper. First quarter prerequisite to second. May be repeated with different content for additional credit. Seminar, 3 hours.

ENG 691 Directed Study (1-3)

Independent reading in areas of student's interest. Preparation for comprehensive examination. Maximum credit three units.

ENG 696 Thesis (1-4)

Independent research and study under faculty supervision. Reporting the results in approved form. Maximum credit 8 units.

Environmental Design

ENV 510 Environmental Design and Graphics (6)

For graduate students with degrees in fields other than environmental design to develop basic skills in design and graphic communications in preparation for advanced methodology. Lecture-discussion, 3 hours, laboratory, 9 hours.

ENV 511 Landscape Planting and Construction (6)

For graduate students with degrees in fields other than landscape architecture to develop the ability to use a basic plant vocabulary and to prepare simple contract drawings. Lecture-discussion, 3 hours, laboratory, 9 hours.

ENV 691 Independent Study (1-4)

Independent study in an area chosen by the student with approval and supervision of faculty. Maximum of 4 units may be earned.

History

HST 610 History of American Business (3)

American business from colonial beginnings to present. Economic, social and political forces influencing the structure and status of business in American life. Consequences of the Industrial Revolution and the prevailing social idealogies upon the organization and ethical values of the business community. Effect of technology, wars, industrialization, and welfare state upon business and its role in society. Lecture-discussion, 3 hours. *Dr. Heath*

International Programs

IPC 599 Foreign Study Topics: (Course Title) (1-6)

Graduate study undertaken in a foreign university under auspices of the California State University and Colleges International Programs. Maximum credit 9 units.

Landscape Architecture

LA 512 Methods and Applications for Landscape Architecture (12)

Exploration of concerns underlying landscape design; processes for dealing with them in area of ecosystems; methods for relating these concerns to planning and design; emphasis on applied ecology, systems analysis techniques, computer applications, and environmental policy and management. Lecture-discussion, 6 hours, laboratory, 18 hours.

LA 513 Landscape and Human Habitat (6)

Application of the design process to the shaping of the landscape for human purposes; exercises involving analysis and synthesis in the use of plant materials, land form, and structures at various scales and levels of complexity. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: ENV 510 or degree in a design discipline.

LA 531 Landscape Construction and Design (6)

Basic methods of landscape alteration, augmentation, and control including grading, drainage, roads and trails, utilities, and small

structures; the uses, limitations, and effects of such alterations. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: ENV 510 or degree in a design discipline or permission of professor.

LA 541 Landscape Planting (6)

Selection of plant associations for the developed landscape on the basis of culture, utility and visual character, and ecological relationships; identification, classification, and use of common basic plants. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: ENV 510 or degree in a design discipline or permission of professor.

LA 551 Graduate Seminar (2)

Analysis and discussion of the structure and organization of the profession of landscape architecture; its history and future. Case studies of professional firms and organizations in the Los Angeles region. Seminar, 2 hours. Prerequisite: LA 601

LA 601 Theory and Literature of Landscape Architecture (6)

Review and analysis of the existing body of literature concerning relationships between man and his natural environment, with particular concentration on ecosystems or human needs according to the preference of the individual student. Lecture-discussion, 3 hours, laboratory, 9 hours.

LA 602 Landscape Design and Natural Processes (6)

Applications of ecosystematic principles and methods explored in the first two quarters to physical problems of landscape design, encompassing a broad and complex range of human and natural considerations. Lecture-discussion, 3 hours, laboratory, 9 hours.

LA 603 Landscape Design and Human Behavior (6)

Application of approaches to the determination, satisfaction and expression of human needs in the shaping of space for human use and habitation. Lecture-discussion, 3 hours, laboratory, 9 hours.

LA 604 Ecosystematic Landscape Design (6)

Applications of the ecosystematic approach to complex large scale problems of landscape design and natural resource planning. Lecture-discussion, 3 hours, laboratory, 9 hours.

LA 605 Design of the Humanized Landscape (6)

Definition and solution of problems in the shaping of space involving human needs both individual and social, as a primary determinant of form. Emphasis on site planning and the urban context. Lecture-discussion, 3 hours, laboratory, 9 hours.

LA 606 Environmental Analysis (6)

Techniques for prediction of alterations in social and natural processes brought about by human use of the land and the application of such assessments to environmental management. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: LA 512 or permission of the professor.

LA 632 Landscape Technology (6)

Application of modern technology to landscape construction involving adaptation of the landscape for human purposes. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: LA 531 or degree in landscape architecture.

LA 642 Plant Ecology and Design (6)

Determination and establishment of appropriate communities of plants for landscapes of varied degrees of development; advanced methods of plant selection and combination. Lecture-discussion, 3 hours, laboratory, 9 hours. Prerequisite: LA 541 or degree in landscape architecture.

LA 652 Graduate Seminar (2)

Seminar presentations and discussion of work in progress by all graduate students. Seminar, 2 hours.

LA 691 Special Project (1)

Individual exploration of particular area of concern. Required each quarter.

LA 692 Directed Research (1-6)

Independent study and research on a subject chosen by the student with the consultation, approval and direction of his adviser.

LA 695 Project (2)

Development of a terminal creative project designed to demonstrate skills and knowledge achieved in the graduate program. The subject will be selected by the student in consultation with his adviser.

LA 696 Thesis (4)

Development of a terminal creative research report, selected by the student and approved by the graduate studies committee, on a problem in the field of landscape architecture.

Mathematics

MAT 511, 512 Real Analysis (4) (4)

Properties of Lebesgue measure and integration, Borel Sets, monotone functions and functions of bounded variation, classical Banach spaces, metric spaces, measure spaces and measurable functions, the Radon-Nikodym theorem, the Fubini theorems, Daniel integrals. Lecture-discussion, 4 hours. Prerequisite: MAT 315

MAT 517, 518 Abstract Algebra (4) (4)

Groups, Sylow theorems, rings and modules, chain conditions, morphism theorems, principal ideal domains, field extensions and finite fields, Galois theory. Lecture-discussion, 4 hours. Prerequisite: MAT 418

MAT 521, 522 Topology (4) (4)

Topological spaces, connectedness, compactness, continuity, separation and countability axioms, metric spaces, product spaces, function spaces and quotient spaces, uniform spaces, paracompactness. Lecture-discussion, 4 hours. Prerequisite: MAT 450 recommended.

MAT 528, 529 Complex Analysis (4) (4)

General form of Cauchy's theorem, conformal mappings, normal families. Riemann mapping theorem, theorems of Mittag-Leffler and Weierstrass, analytic continuation. Picard's theorem. Selected topics such as Dirichlet's problem, generalization of Picard's theorem, gamma and zeta functions. Lecture-discussion, 4 hours. Prerequisite: MAT 429

MAT 535 History of Mathematics (4)

Historical development of selected mathematical topics drawn generally from the body of 18th Century and later mathematics. Topics to be covered announced by the professor prior to registration. Lecture-discussion, 4 hours. Prerequisite: Consent of instructor.

MAT 544, 545 Topics in Applied Mathematics (4) (4)

Topics from applied mathematics with emphasis on modern mathematical techniques as well as their related abstract concepts; linear operators, integral transforms, partial differential equations, the eigenvalue problem, integral equations, calculus of variations, tensor analysis, group representations. Lecture-discussion, 4 hours.

MAT 550 Seminar in Mathematics (1-3)

Topics in advanced mathematics chosen according to the interests and needs of the students enrolled. Each seminar will have a subtitle according to the nature of the content. Seminar, 1 to 3 hours. Prerequisite: Instructor's approval. May be repeated for a maximum of 6 units.

MAT 691 Directed Readings (1-2)

Individual reading program in an area chosen by the student under the direction and supervision of the faculty. Maximum of 4 units credit.

MAT 695 Project (1-3)

Independent research and study under supervision of the faculty. Reporting of research results in an acceptable form. Maximum of 3 units credit.

Physical Education

PE 510 Philosophical Bases of Physical Education (3)

The development of the philosophies of physical education and the assumptions upon which current professional philosophies rest. Lecture-discussion, 3 hours. *Dr. Bassin*

PE 540 Cultural Patterns and Physical Education (3)

Preparation and presentation of critical reviews of literature in sociology of sport. The topics to be considered are: the impact of sport on industry, economics and the institution of politics and education, and sport as it affects man's sociocultural development and his value system. Lecture-discussion, 3 hours. *Miss Oliver*

PE 550 Problems in Administration of Physical Education (3)

Study and critical analysis of theories and philosophies relating to administrative situations. Effective evaluation with reference to interrelated conditions, decision-making, and developing an integrated way of behaving while implementing decisions. Lecture-discussion, 3 hours. Prerequisite: PE 420. *Dr. Lansford*

PE 553 Curriculum Development in Physical Education (3)

Basic considerations and problems of physical education curricula in secondary schools. Lecture-discussion, 3 hours. *Dr. Syverson*

PE 580 Advanced Motor Learning and Human Performance (3)

Preparation and presentation of critical reviews of literature in motor learning. Topics are: kinesthesis, reaction time, strength in neuromotor coordination, motor learning, and transfer factors affecting motor performance. Lecture-discussion, 3 hours. *Dr. Bassin*

PE 583 Advanced Motor Development (3)

Analysis of physical growth and motor development from infancy to adulthood. Changes in anthropometric measurements, rates of growth of various body tissues, organs, and segments, and ossification of the skeleton during childhood and adolescence. Aspects of motor development at various ages. Lecture-discussion, 3 hours. Prerequisite: PE 312 or 322. *Dr. Bassin*

PE 590 Research Methods and Design (3)

Advanced evaluation of experimental design, instrumentation procedures and analysis of factors relating to human performance. Lecture-discussion, 3 hours. Prerequisite: PE 425 and a course in basic statistics, or the equivalent. *Dr. Ridgway*

PE 640 Socio-cultural Aspects of Sport (3)

Discussion and analysis of interrelationships between sport and society. Consideration of sport as a subsystem of more inclusive social systems. Development of sociological, anthropological, and cultural implications and patterns. Lecture-discussion, 3 hours. *Dr. Ridgway*

PE 643 World History of Physical Education (3)

The development of physical education from ancient times to the present in both Eastern and Western cultures. Emphasis on the growth and development of physical education in Greece and Rome. Lecture-discussion, 3 hours. *Dr. Emery*

PE 645 The Behavioral Sciences of Human Movement (3)

Preparation and presentation of critical reviews of current research literature in behavioral science of physical education leading to an understanding of the research process and applying techniques to the solution of specific problems. Seminar, 3 hours. *Dr. Emery*

PE 650 Problems in Physical Education (3)

Recent developments in physical education; relations with other social and educational agencies, curriculum changes, professional organization, individual and group problem solving. Seminar, 3 hours. *Dr. Syverson*

PE 653 Supervision of Physical Education (3)

Emerging concepts and principles of physical education supervision; application to situations in which administrators, supervisors, coordinators and teachers are working. Lecture-discussion, 3 hours. Prerequisite: PE 420. *Dr. Lansford*

PE 680 Advanced Kinesiological Analysis (4)

Advanced kinesiological analysis of athletics utilizing knowledge of muscle groups, principles of movement, and principles of human performance to develop a logical and cohesive understanding of human movement. Lecture-discussion, 3 hours, laboratory 2 hours. Prerequisite: PE 302, or equivalent. *Dr. Gasser*

PE 683 Advanced Physiology of Exercise (4)

Lectures on the physiological adjustments made by the body during exercise and the changes which result from prolonged periods of intensive physical training. Laboratory instruction and experiments using various instruments for physiological testing. Lecture-discussion, 3 hours, laboratory, 2 hours. Prerequisite: PE 303. *Dr. Teghtmeyer*

PE 685 The Scientific Bases of Physical Education (3)

Group discussion and individual presentations concerning the literature, research, and problems in the areas of anatomy, kinesiology, physiology of exercise, and motor learning. Seminar, 3 hours. Prerequisites: 6 units of graduate credit in area of specialization and/or consent of instructor. *Dr. Teghtmeyer*

PE 691 Independent Study (1-2)

Independent study in an area chosen by the student under the direction and supervision of faculty.

PE 696 Thesis (1-3)

Development of a terminal creative research report on a topic selected by the student, approved by the department graduate studies committee and submitted to the faculty as evidence of his mastery of the principles of the profession. May be scheduled for a maximum of 9 units.

Physics

PHY 550 Seminar in Physics (1-3)

Special problems in selected areas of physics. Seminar, 1 to 3 hours. Maximum of 6 units may be earned.

Political Science

PLS 550 Seminar in Political Science (1-4)

Topics in fields of Political Science offered according to interests and needs of students. Each seminar to have subtitle identifying the field. Seminar, 1-4 hours. Prerequisites: Graduate standing, instructor's approval. May be repeated for maximum of 12 units.

Social Sciences

SSC 550 Seminar in the Social Sciences (1-3)

Special problems in selected areas of the social sciences. Each seminar will have a subtitle describing its nature and content. Seminar, 1 to 3 hours. May be repeated for a maximum of 9 units.

Teacher Preparation

TEP 503 Secondary Curriculum Procedures and Methods (3)

Curriculum and teaching techniques for the sceondary school. A separate course will be taken in the major and the minor field. Lecture-discussion, 3 hours. Prerequisite: Admission to teacher preparation program.

TEP 504 Seminar in Secondary Education (3)

Critical analysis of problems of teaching in the secondary schools, including ethnic studies and human relations. Concurrent enrollment in secondary-school student teaching. Lecture-discussion, 3 hours.

TEP 505 Philosophical-Sociological Foundations of Education (4)

Examination of fundamental aspects of education through philoosphical and sociological analysis; American cultural values and their influence on crucial issues in education. Lecture-discussion, 4 hours. Prerequisite: Admission to teacher preparation program or teaching credential.

TEP 508 Philosophy of Vocational Education (3)

Philosophy and organization of vocational education programs. Development of modern approaches to an integrated program based upon occupational opportunities and community needs. Developments in curriculum, occupational training, youth groups, summer programs, and distributive education. Lecture-discussion, 3 hours. Prerequisite: Consent of instructor.

TEP 509 Education of Contemporary Youth (4)

The dynamics of contemporary youth in the public secondary school. Values of youth, major problems, struggles, and conflicts as adolescents move toward maturity. Cultural and societal values which have an impact on youth; role of teacher and school in helping young people achieve identity. Lecture-discussion, 3 hours, activity, 2 hours. Prerequisite: TEP 410 or consent of professor.

TEP 510 Interpersonal Relations in Teaching (3)

Examination of personality factors that are obstacles to effective teaching; emphasis

upon developing open and authentic interpersonal relationships. Role-playing, demonstrations and other laboratory activities. Lecture-discussion, 2 hours, laboratory, 2 hours. Prerequisite: TEP 410 and consent of instructor.

TEP 511 Prescriptive Teaching and Behavioral Objectives (3)

Learner behaviors, reinforcers and elicitors; establishing learner entering behavior and performance requirements; writing precise educational objectives. Lecture-discussion, 3 hours. Prerequisites: TEP 410 or consent of instructor.

TEP 512 Measurement in Education (4)

Principles and practices in the construction of teacher-made tests and other forms of assessment devices. Basic concepts of validity, reliability, and standardization of educational-psychological tests. Standardized group tests currently used in schools with emphasis upon the uses and abuses of the testing process. Lecture-discussion, 3 hours, activity, 2 hours. Prerequisite: Post-baccalaureate standing.

TEP 520 Diagnosis of Reading Difficulties (3)

Diagnosis and remediation of handicapped readers. Practice in diagnostic procedures, tests, and laboratory equipment. Use and interpretation of tests for the analysis of reading difficulties; methods of difficulty analysis, diagnostic test evaluation, assessment of psychological, emotional and physical factors. Lecture-discussion, 3 hours. Prerequisite: TEP 410 and 426

TEP 521 Analysis of Corrective Reading Practices and Techniques (3)

Inhibiting factors associated with reading disabilities among school children; informal techniques of reading evaluation and corrective procedures in improvement of word recognition, vocabulary and comprehension skills; materials and organization of corrective programs. Group and individual techniques, case studies. Lecture-discussion, 3 hours. Prerequisite: TEP 520

TEP 522 Laboratory of Clinical Practice: Treatment of Reading Disorders (3)

Observation and supervised experience in individual and group diagnostic and therapeutic procedures. Supervised case study, diagnosis and remedial instruction in reading. Student will practice individual tutoring, group remedial activities, parent interviews, case study and clinic reports. Lecture-discussion, 2 hours, activity, 2 hours. Prerequisite: TEP 521

TEP 523 Development of Pre-reading Skills (3)

The young child's development in reading readiness. Clinical and laboratory experience in assessment of individual functioning in reading. Criteria for selection of curriculum materials and procedures in the development of pre-reading skills. Lecture-discussion, 3 hours. Prerequisites: TEP 410, 426

TEP 525 Psychology of Reading (3)

Historical development of selected theories and models of the reading process. Investigation and analysis of the interrelationships of the reading act: cognitive processes, languages, experience, and social-emotional factors. Lecture-discussion, 3 hours. Prerequisite: TEP 426

TEP 530 Education of the Slow Learner and the Retarded Child (3)

Ethology and origin of retardation. The training of the slow learner and the mentally retarded. Curriculum principles, methods, sources of materials with emphasis on reading. Lecture-discussion, 2 hours, laboratory, 2 hours. Prerequisite: TEP 410 and consent of instructor.

TEP 531 Education of the Gifted Child (3)

Differential aptitudes and characteristics of gifted children; identification, acceleration, grouping and curriculum enrichment. Evaluation of programs, problems of under-achievement, counseling, reading, development of talent. Lecture-discussion, 2 hours, laboratory, 2 hours. Prerequisite: TEP 410 and consent of instructor.

TEP 540 Historical and Philosophical Bases in Early Childhood (3)

History of the major forces in the education of the young child. Analysis of philosophies and major trends in early childhood education. Lecture-discussion, 3 hours. Prerequisite: TEP 437 or equivalent.

TEP 541 Learning Patterns in Early Childhood (3)

Examination and evaluation of learning skills in early childhood education: socio-emotional, perceptual-motor, and cognitive. Programs which emphasize specific learning patterns. Approaches to the evaluation of learning patterns in early childhood. Lecture-discussion, 3 hours. Prerequisite: TEP 540 or equivalent.

TEP 542 Curriculum in Early Childhood Education (3)

Major curriculum models used in early childhood education. Examination of curricula emphasizing the needs of the child, the environment, and the teacher. Lecture-discussion, 3 hours. Prerequisite: TEP 540 or equivalent.

TEP 550 Seminar in Educational Issues (2-3)

Intensive study of selected issues, problems, or areas in education, according to the interests of the students enrolled. Each seminar subtitled by its content. Seminar, 2-3 hours. May be repeated for a maximum of 6 units.

TEP 570 Utilization of Media in the Classroom (3)

Role of media in classroom learning. Systematic approach to instructional development of utilizing media. Skills in using equipment and materials. Lecture-discussion, 2 hours, activity, 2 hours. Prerequisite: Graduate standing.

TEP 571 Graphics for Classroom Instruction (3)

Planning, preparation, and utilization of graphic presentations in classroom learning. Charts, graphs, transparencies, mechanical lettering, mountings, and preserving techniques. Lecture-discussion, 2 hours, activity, 2 hours. Prerequisite: TEP 570

TEP 574 Preparation of Audio Media (3)

Planning and preparation of scripts; production of recordings on cassette and reel-to-reel magnetic tape, video tape, and film. Principles of storing sound for retrieval. Lecture-discussion, 2 hours; activity, 2 hours. Prerequisite: TEP 571

TEP 650 Seminar in Current Problems and Strategies in Education (2-3)

Critical treatment of new strategies, innovations, conditions, and the findings of research that currently affect or involve education. Choice of topics will be related to contemporary education problems. Seminar, 2-3 hours. May be repeated for a maximum of 6 units.

TEP 688 Critique of Research in Education (3)

Survey and critical analysis of selected educational research and other related literature in the major divisions of education. Emphasis on fundamentals of research design and interpretation of related statistics. Lecture-discussion, 3 hours. Prerequisite: TEP 512

TEP 689 Methods and Techniques of Research (3)

Analysis of research methodology. Emphasis on educational research and efficient use of reference library facilities. Survey of the methods employed in educational research, common research errors, and problems of criteria. Lecture-discussion, 3 hours. Prerequisite: TEP 688

TEP 691 Independent Study (1-3)

An intensive study of a particular problem in education under the direction of a member of the Teacher Education Advisory Committee. Maximum credit, 3 units. Prerequisite: Consent of a professor to act as sponsor.

TEP 695 Project (1-3)

Independent research leading to successful completion of a project. Open to graduate students advanced to candidacy and with approval of adviser. Maximum credit, 6 units. Prerequisite: TEP 688

TEP 696 Thesis (1-3)

Independent research leading to successful completion of a thesis. Open to graduate students advanced to candidacy and with approval of adviser. Maximum credit, 6 units. Prerequisite: TEP 688

Urban Planning

UP 511, 512 Urban Planning Theory and Practice (4) (4)

History of urban planning; planning process; analysis and quantitative methods; major determinants of land use; principles and standards for projecting land requirements and locations for various uses; implementing plans; power structure influence on planning decisions; land subdivision. Case studies. Lecture-discussion, 3 hours, studio, 3 hours.

UP 534 Urban Housing and Development (4)

Housing requirements and prospects; the urban renewal role in the city; local, state, and federal housing and community development policies; alternative solutions to housing problems. Lecture-discussion, 3 hours, studio, 3 hours.

UP 535 Urban Data and Simulation Programs (4)

Use of computers in urban planning; mathematical models, gaming methods, simulation techniques, and data systems. Application of advanced urban planning methods and and techniques to the solution of urban problems; extensive exercise in computer use. Lecture-discussion, 3 hours, studio, 3 hours.

UP 536 Urban Transportation and Circulation Systems (4)

Problems of planning for urban transportation and circulation facilities. Interrelationship of these systems with land use; future requirements. Public and private responsibilities. Lecture-discussion, 3 hours, studio, 3 hours.

UP 537 Regional, State, and National Planning (4)

Theory and methodology of regional planning; land use and resource plans and regulations; policy planning; political influences; creation of new institutions and agencies to guide change; planning for developing regions and countries; the future of regional, state, and national planning. Lecture-discussion, 3 hours, studio, 3 hours.

UP 621 Design of Urban Projects and Spaces (4)

Design assignments in the city, such as open spaces, large scale public works projects. Commercial, industrial, and institutional land use, preparation and presentation of workable design solutions considering all aspects of the problems. Lecture-discussion, 1 hour, studio, 9 hours.

UP 622 Design of the Residential Environment (4)

Creation of new housing policies and programs; design involving a variety of types of living areas; redesign of in-city neighborhoods. Lecture-discussion, 1 hour, studio, 9 hours.

UP 623 Design of the Metropolis (4)

Urban systems in metropolitan policy planning. Emphasis on data tabulation, statistical evaluation, computer mapping, urban simulation. Evaluation of the validity of analytical procedures in urban decision-making. Lecture-decision, 2 hours, studio, 6 hours. Prerequisite: UP 535 and/or permission of professor.

UP 651 Planning in Contemporary Scoiety (3)

Contemporary urban social trends and projected conditions as they affect urban planning and its future; emerging relationships of planning to political, social, and economic institutions; advocacy planning and the role of citizen groups; the planner's role in contemporary urban society. Seminar, 3 hours.

UP 652 Planning Administration and Professional Practice (3)

Administration of planning agencies; development and administration of planning and community development programs; the place of planning in local government organization and structure; function of the professional planner in public and private practice; professional ethics and responsibilities. Seminar, 3 hours.

UP 691 Urban Research Methods and Techniques (3)

Methodology and techniques of research in urban planning. Lectures and class discussions; directed individual student research on a subject or subjects of importance in urban planning. Student must demonstrate competence in the methodology and the techniques of urban planning research. Lecture-discussion, 3 hours.

UP 695 Project (1-3)

Development of a terminal research and/or design project on a topic selected by the student, approved by the graduate studies committee, and submitted to the faculty in acceptable form. Maximum credit, 9 units.

UP 696 Thesis (3)

Development of a terminal research report on a topic selected by the student, approved by the graduate studies committee and submitted to the faculty as evidence of his mastery of the principles of his profession. Maximum credit, 9 units.

FACULTY OF THE GRADUATE DIVISION

The faculty of the Graduate Division consists of those members of the university faculty who have been named to it by their departments and school deans. Based upon their academic and professional qualifications, they are designated to teach graduate-level courses, supervise graduate research and advise graduate students in the disciplines indicated.

School of Agriculture

Frederick E. Beckett, Ph.D.
Agricultural Engineering
Elton O. Brooks, M.S.
Agricultural Business Management & International Agriculture
Joel W. Carter, M.S.
Ornamental Horticulture
Allen C. Christensen, M.S.
Animal Science
Dale R. Christiansen, M.S.
Ornamental Horticulture
Haven Q. Conard, M.S.
Agriculture Engineering
Anahid Crecelius, Ph.D.
Foods and Nutrition
Gerald L. Croissant, Ph.D.
Plant and Soil Sciences
James L. Degen, M.S.
Ornamental Horticulture
Norman K. Dunn, M.S.
Animal Science
Ramiro C. Dutra, Ph.D.
Foods and Nutrition
Homer D. Fausch, Ph.D.
Animal Science
Jack T. Gesler, M.S.
Animal Science
John Hanson, M.S.
Agricultural Business Management & International Agriculture
Kenneth R. Hobbs, Ph.D.
Plant and Soil Sciences
William C. Hughes, M.S.
Agricultural Business Management & International Agriculture
Eugene K. Keating, Ph.D.
Animal Science
Mack H. Kennington, Ph.D.
Animal Science
Arlin D. Knight, Ph.D.
Animal Science
Kent W. Kurtz, M.A.
Ornamental Horticulture
Sandi Lieb, Ph.D.
Animal Science
Cheryl L. Loggins, M.S.
Foods and Nutrition
Cedric Y. Matsushima, Ph.D.
Animal Science
Floyd V. Matthews, Jr., Ph.D.
Agricultural Engineering
Russell F. McDonald, Ph.D.
Agricultural Business Management & International Agriculture
Edward A. Nelson, Ph.D.
Animal Science
Lloyd A. Newell, M.S.
Plant & Soil Sciences & Fruit Industries
Robert H. Packard, D.V.M.
Animal Science
Gaylord P. Patten, Ph.D.
Plant & Soil Sciences
Paul Peterson, Ph.D.
Vocational Agriculture
Robert J. Schlechter, D.V.M., Ph.D.
Animal Science
Thomas W. Westing, M.S.
Animal Science
M. Robert White, M.S.
Agricultural Business Management & International Agriculture

School of Arts

Charles W. Ackley, Ph.D.
Social Sciences
Mohammed Al-Saadi, Ph.D.
Political Science
Taha H. Al-Sabea, Ph.D.
Economics
V. Barney Anooshian, Ed.D.
Physical Education
Albert J. Aschenbrenner, Ed.D.
Social Sciences
Stanley L. Bassin, Ph.D.
Physical Education
James Bell, Ed.D.
Physical Education
Samuel I. Bellman, Ph.D.
English and Modern Languages
Leo W. Berg, Ph.D.
English and Modern Languages

Melvin H. Bernstein, Ph.D.
Political Science
Sidney M. Blumner, Ph.D.
Economics
S. Ralph Bobb, Ph.D.
English and Modern Languages
Gertrude C. Boland, Ph.D.
Economics
Robert T. Bray, Ph.D.
Economics
Cecil B. Brown, M.A.
Social Sciences
Anthony L. Brundage, Ph.D.
History
John H. Burma, Ph.D.
Behavioral Sciences
John R. Butterworth, Ph.D.
English and Modern Languages
Sidney Carlin, Ph.D.
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Alexander H. Chorney, Ph.D.
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Kenneth H. Cochrane, M.A.
Physical Education
Stanley J. Cook, Ph.D.
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Gary A. Cretser, Ph.D.
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Raymond C. Daugherty, M.S.
Physical Education
Thomas J. Elliott, Ph.D.
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L. Lynne Emery, Ph.D.
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John H. Esterline, Ph.D.
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W. McKee Evans, Ph.D.
History
Joseph R. Farrell, Ph.D.
English and Modern Languages
Jack B. Frost, M.S.
Physical Education
John F. Fulbeck, Ph.D.
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George T. Galbreath, M.A.
Economics
Diana M. Gallardo, M.A.
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Otto F. W. Gasser, Ed.D.
Physical Education
Donald L. Halderman, M.S.
Physical Education
Ruth M. Harmer, Ph.D.
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C. Edwin Harwood, Ph.D.
English and Modern Languages
Frederick B. Heath, Ph.D.
History
William F. Hill, Ph.D.
Behavioral Sciences

Franklin Y. Ho, Ph.D.
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Ralph B. Hutchinson, Ph.D.
Economics
Richard S. Hyslop, J.D.
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L. Stanley Jackson, M.A.
Physical Education
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Economics
George B. Jenkins, M.S.W.
Social Services
Shah Wali Khan, Ph.D.
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Louis King, Ed.D.
Behavioral Sciences
Margaret Mary Kinzel, Ph.D.
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Jessie I. Klinger, M.S.
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Hugh O. LaBounty, Jr., Ed.D.
History
Frank D. Lansford, Ed.D.
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William R. Larson, Ph.D.
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Marcia E. Lasswell, M.A.
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Harold Levitt, Ph.D.
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Gloria R. Lothrop, Ph.D.
History
Werner H. Marti, Ph.D.
History
William L. McAdams, Ph.D.
English and Modern Languages
Forrest L. McElhoe, Jr., Ph.D.
Social Sciences
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English and Modern Languages
Frederick Meeker, Ph.D.
Behavioral Sciences
Ahmed M. Metwalli, Ph.D.
English and Modern Languages
Monica B. Morris, Ph.D.
Behavioral Sciences
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David J. Park, Ph.D.
Economics
Daniel E. Peterson, M.S.
Physical Education
Ronald M. Peterson, Ph.D.
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Donald H. Pflueger, M.A.
History
Joseph L. Philbrick, Ph.D.
Behavioral Sciences

Glen D. Phillips, Ph.D.
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Arthur Ridgway, Ed.D.
Physical Education
Robert Righter, Ph.D.
History
Floyd H. Ross, Ph.D.
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Robert M. Schweider, M.A.
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Milton M. Shapiro, Ph.D.
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Dale G. Stallings, Ph.D.
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Emilio Stanley, Ph.D.
Social Sciences
Otis P. Starkey, Ph.D.
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Joics B. Stone, Ph.D.
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Robert B. Stull, M.A.
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Magnus Syverson, Ed.D.
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Halsey P. Taylor, Ph.D.
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Stanley Taylor, Ph.D.
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Leo Teghtmeyer, Ph.D.
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Theodore N. Weissbuch, Ph.D.
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Stephen V. Whaley, Ph.D.
English and Modern Languages
Lillian Wilds, Ph.D.
English and Modern Languages
Bruce E. Wilson, M.A.
Political Science
George Wong, Ph.D.
History
Rudolph Zrimc, Ph.D.
English and Modern Languages

School of Business Administration

Thomas H. Athey, M.S.
Data Processing
Martin K. Barrett, M.A., C.P.A.
Accounting
Wallace C. Benjamin, M.C.S.
F.I.R.E.
Richard J. Bergstrom, J.D.
Business Management
Edward A. Bonard, M.P.A.
Business Management
John K. Cheever, M.B.A., C.P.A.
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Madeline A. Currie, M.A.
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Frederick G. Cutler, M.B.A.
Marketing Management
Leon A. Dale, Ph.D.
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Peter P. Dawson, D.B.A, C.D.P.
Data Processing
Ronald W. Eaves, M.A., C.D.P.
Data Processing
Keith B. Ehrenreich, M.B.A., C.P.A.
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David G. Foley, Ed.D.
Business Management
William E. Fox, D.B.A.
Marketing Management
Hugh D. Grove, M .B.A., C.P.A.
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F.I.R.E.
Koichiro Isshiki, Ph.D.
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Barry A. Knight, M.B.A., C.P.A.
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Gilbert J. McKee, Ph.D.
Business Management
Peter K. Mills, M.B.A.
Business Mangement
Richart T. Nelson, M.S.
F.I.R.E.
Celestine C. Nwacukwu, Ph.D.
Business Management

Frank Paul, M.A., C.P.A.
Business Management
James C. Petersen, M.B.A.
Marketing Management
Eugene Pinchuk, M.B.A., C.P.A.
Accounting
Raymond C. Rauch, M.B.A.
F.I.R.E.
James E. Ross, Ph.D.
Marketing Management
Alvin C. Ruppert, M.B.A.
F.I.R.E.
R. Richard Sabo, M.B.A.
Business Management
Richard H. Schoning, M.B.A.
Business Management
Katherine B. Seibert, M.A., C.P.S.
Business Management
L. George Smith, D.B.A.
Marketing Management
Richard H. Smith, M.B.A., C.D.P;
Data Processing
Stanley B. Smith, M.B.A.
Marketing Management
Robert E. Stroud, M.B.A.
Data Processing
Robert V. Stumpf, M.S., C.D.P.
Data Processing
Charles L. Taylor, M.B.A.
Marketing Management
James W. Taylor, M.B.A.
Marketing Management
Ward D. Testerman, M.S.
Data Processing
William B. Theisman, M.Acc., C.P.A.
Accounting
Sandra Toy, M.A.
Business Management
Gerald E. Wagner, M.A., C.D.P.
Data Processing
Warren C. Weber, Ed.D.
Business Management
Paul F. Weisend, J.D.
Business Management
Mary E. Whitley, M.S.
Business Management
D. Wayne Williams, M.B.A.
Business Management
G. Dow Worley, M.B.A.
Business Management

School of Engineering

C. James Barr, Ph.D., P.E.
Chemical & Materials Engineering
Robert L. Beardmore, M.E., P.E.
Mechanical Engineering
Melvin B. Belcher, M.S.
Electrical & Electronics Engineering
John R. Biddle, Ph.D.
Mechanical Engineering
Donald E. Breyer, M.S.
Civil Engineering
Robert A. Bruns, M.S., P.E.
Electrical & Electronics Engineering
Christopher Caenepeel, Ph.D.
Chemical & Materials Engineering
Charles E. Cartmill, Ph.D.
Mechanical Engineering
Jacob I. Castleman, M.S., P.E.
Electrical & Electronics Engineering
Shu-Bing Chan, Ph.D.
Electrical & Electronics Engineering
Henry M. Clanton, Ph.D.
Electrical & Electronics Engineering
David L. Clark, M.S.
Electrical & Electronics Engineering
John W. Comer, M.S., P.E.
Civil Engineering
Donald C. Curran, A.E.
Aerospace Engineering
Robert G. Feeny, M.S.
Chemical & Materials Engineering
Alan P. Felzer, Ph.D.
Electrical & Electronics Engineering
Arthur J. Glenn, M.S.
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