COLLEGE OF AGRICULTURE

Lester C. Young, Dean
_____, Associate Dean

Master of Science in Agriculture

The Master of Science in Agriculture includes the subplans of:

- Agricultural Science
- Animal Science
- Irrigation Science
- Nutrition and Food Science
- Plant Science

Certificates

Landscape Irrigation Design

Credentials

Agricultural Specialist, Agriculture Single Subject

The Master of Science degree program in Agriculture is oriented towards students seeking advanced studies in a chosen discipline area of agriculture, food, environmental, biotechnology, and medical industries, as well as education and professional schools, have need for graduates with a Master of Science degree in Agriculture. The various subplans provide academic challenges through scientific literature, research methodologies and design, statistical analysis and/or development of professional technical expertise. Graduates find relevant career opportunities to their advanced degree in business, education, government and cooperative education. The completion of the M.S. degree prepares qualified students for a variety of opportunities including pursuit of further specialized training, entrance into professional schools and/or Ph.D. programs.

Admission to the Program

In the pages that follow this section, each subplan identifies its requirements for admission to the program in academic qualifications, GPA, test requirements/test scores, and advancement to candidacy.

Requirements

In the pages that follow this section, each subplan lists its requirements for total units, GPA, thesis vs. non-thesis, as well as enrollment.

Advancement to Candidacy

In the pages that follow this section each subplan specifies its requirements for advancement to candidacy in the areas of units, test requirements, faculty approvals and contract submission and approval.

Graduate Advisory Committee

In the pages that follow this section each subplan describes its requirements for the graduate student's faculty committee.

DEPARTMENTS

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CENTERS

AGRIscapes

Dan Hostetler, Director

AGRIscapes is an education and demonstration center devoted to food, agriculture, and the urban environment. The Farm Store at Kellogg Ranch serves as the major marketing outlet for Cal Poly Pomona produced fruits, vegetables, nursery products, and meats. This 40-acre complex provides educational opportunities for students within the College of Agriculture in the areas of marketing, production, merchandising, and promotion of agricultural products. It also provides the campus and surrounding community with a valuable educational tool to learn about agricultural products and their impact on daily lives.

Apparel Technology and Research Center (ATRC)

Peter Kilduff, Director

The Apparel Technology and Research Center (ATRC) provides outreach services for apparel and related businesses, and professional and government organizations. The Center offers applied research and technology transfer services, as well as on-line education, consulting and information services through the ATRC website www.csupomona.edu/atrc. The ATRC is a self-supporting center funded by industry.

Center for Antimicrobial Research and Food Safety (CARFS)

Shelton Murinda, Director

The Center for Antimicrobial Research and Food Safety (CARFS), participates in research involving microbial foodborne pathogens of public health and economic significance with an emphasis on pathogens associated with muscle foods (meat and meat products). Research focuses on isolation, identification and characterization of pathogens using conventional and molecular-based methods (genetic fingerprinting) and development of on-farm and processing-plant based interventions. Emergence of new foodborne pathogens, increased consumer awareness, and federal recommendations on food safety/public health issues redefine the rules of microbial pathogen quality control in the food industry. CARFS (formerly Center for Antimicrobial Research CAR) was established to meet these corporate demands. The Center's on-farm food saftey goals will be linked to regional/Homeland Security efforts. Future research will also target discovery and application of natural antimicrobial agents.

Center for Turf, Irrigation and Landscape Technology (CTILT)

Sowyma Mitra, Director

CTILT provides a focal point for teaching, research and testing, and industry outreach in the areas of turfgrass, ornamental plant materials, landscape irrigation technology, water management, landscape operations, sports turf and golf course management. Industry sponsored research projects on irrigation system component development, PVC pipe systems, WICK irrigation, water management, and fertilizer trials are on going. Industry sponsored short courses on landscape irrigation design, water management and landscape management are offered.

Equine Research Center

The Equine Research Center, founded in 1980, complements the programs of the W.K. Kellogg Arabian Horse Center. The Research Center, unlike the Arabian Center, deals with all horse breeds and not only the Arabian. The Research Center conducts investigations in the areas of equine nutrition, physiology, and management. The Research Center is a self-supported center funded through private donations with the major contributor being the Oak Tree Racing Association.

W.K. Kellogg Arabian Horse Center

William Hughes, Director

The Center continues the tradition of the Kellogg Ranch, which has been one of the world's outstanding Arabian horse breeding farms, perpetuating the Arabian and making valuable blood lines available to the public. The Arabians are utilized in the animal science courses related to the ever-expanding field of light horse production, research and training. Public performances are given on the first Sunday of the month, October through May, at 2p.m. In July 1989, the University established an equine outreach program to serve the interest of all breeds and horse audiences. The primary objective of this program was to develop educational opportunities and programs that would address the needs and challenges of the horse industry.

Responsibilities of the equine educational program include providing educational programs to the horse public and addressing the specialized needs of the commercial equine industry. Programs are also developed to meet the needs of specialized clientele.

COLLEGE OF AGRICULTURE

MASTER'S DEGREE CORE CLASSES

AG 500 Introduction to Graduate Research in the Agricultural Sciences (3)

Principles, tools and techniques used in scientific research as applied to the agricultural sciences. Topics will include the development of literature reviews and annotated bibliographies, appropriate literature citation, on-line research methods and sources, the identification and definition of a research topic and its rationale. Readings, discussions, computer applications, and research. 3 seminar hours.

AG 510 Design and Analysis of Experimental Research I: Methods for ANOVA (4)

Experimental statistics. Applications of statistical estimation and inference. Correlation; analysis of variance for completely randomized design, randomized blocks, Latin squares, factorials and analysis of covariance; non-parametric statistics. Concepts of design for experimental investigations. 4 lecture discussions. Prerequisite: AG 500 and STA 120 or equivalent.

AG 520 Empirical Research Methods Using Regression Analysis (3)

Regression analysis is an enormously popular tool, used ubiquitously in research in the biological sciences. Students will be exposed to the mathematical aspects of empirical research methods and will be able to use computer applications using regression analysis. Students will be exposed to a wide range of problems to which regression analysis can be applied and how to represent those problems in a way that cleverly utilizes readily available data. 3 lecture discussions. Prerequisite: AG 510.

AG 530 Research Proposal (3)

The preparation and presentation of the proposed thesis research problem to the faculty of the College of Ag and interested public. The student will develop and present, with the aid of the major professor, the scientific and statistical hypotheses, research design, proposed analytical methodologies, as well as a substantial selection from the literature review demonstrating the need and validity of the proposed thesis study. Prerequisite: AG 510.

AG 550 Advanced Topics in Agriculture (1–4)

Analysis and discussion based on literature, recent research advancement, regulation and public policy. Topics will be identified as to specific subject matter.

AG 599 Special Topics in Agriculture (1–3)

Group study of a selected topic in agriculture which is specified in advance for graduate students. Total credit limited to 3 units.

AG 697 Comprehensive Examination (1) (Credit/No credit)

Preparation for and completion of the written comprehensive examination. The examination may be taken no more than two times. Failure to complete it satisfactorily the second time will result in termination from the program. Advancement to Candidacy required.

AGRICULTURE

Master of Science in Agriculture

Agricultural Science Subplan (Agricultural Education)

www.csupomona.edu/agsci

_____, Program Director and Graduate Coordinator
M.S. in Agriculture, Agricultural Science Subplan and Agricultural Education Advisor

Agricultural Science Concentration

The Master of Science degree in Agriculture, Agricultural Science subplan provides students the opportunity to enhance knowledge and competence in a selected area of specialization and encourages individual study and research. The curriculum is designed to assist individuals employed in agricultural education to become more proficient in research methodology and design, statistical analysis, utilization of technology, and advance in a concentration area of their choice. Students desiring additional experience with industry can include an internship in an industry sector they choose. This degree has successfully enhanced the careers of individuals employed in public schools, community colleges, universities, cooperative extension, and other agricultural career fields.

ADMISSION TO THE PROGRAM

An applicant for admission to the master's degree program in Agricultural Science should have a baccalaureate degree in agriculture and will complete the requirements for a Single Subject and Specialist Credential in Agriculture prior to advancing to candidacy and taking the comprehensive exam. Applicants without a baccalaureate degree in agriculture will be required to take undergraduate level courses in the College of Agriculture prior to being unconditionally admitted into the program. A cumulative undergraduate grade point average of 2.75 overall, or 2.75 in the final 90 units of coursework, is required. In addition, the Agricultural Education Program Coordinator must receive three letters of recommendation from individuals familiar with the applicant's academic qualifications and potential as a graduate student. International students seeking admission into the program must achieve a score of 550 on the TOEFL. An applicant not meeting these standards may be conditionally admitted with the approval of the program's Graduate Admissions Committee. The conditional student must comply with the requirements of admission within three quarters.

The student, along with an appointed advisory committee, will develop a program by the end of the second quarter, based on the student's interests and preparation. The student's approved program will include required basic core courses, a selection of additional courses in a specialization, electives, independent study, and a thesis or comprehensive examination. The student must have on file an approved program within two quarters of admission to the master's program. Students electing to complete additional coursework and the comprehensive examination in lieu of the thesis must be agricultural education teachers.

Advancement to Candidacy

Admission to the program does not admit a student to candidacy for the degree. Advancement to Candidacy is contingent upon the recommendation of the graduate coordinator. A student who has not been admitted to candidacy is not eligible to register for the thesis (AGS 696) or comprehensive examination (AGS 697). In order to advance to candidacy for the Master of Science in Agriculture, Agricultural Science subplan, a student must: (1) complete at least 12 units of graduate coursework at Cal Poly Pomona with a GPA of 3.0 or better; (2) pass the Graduation Writing Test; and, (3) with the major professor and Graduate Coordinator, develop and file a program of study. The official program of study must be prepared and submitted for approval no later than the end of the second quarter of attendance.

REQUIREMENTS

1. The degree program shall include a minimum of 45 quarter units of which at least 24 units shall be in 500- or 600-level courses. Additional coursework may be required to eliminate subject matter deficiencies. At least 24 units must be within the broad field of agriculture.
2. A grade point average of 3.0 (B) or better must be maintained in all upper division undergraduate and all graduate courses. No course with a grade lower than "C" (2.0) may apply toward the fulfillment of degree requirements.
3. No more than 13 quarter units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.
4. Graduate students enrolled in the Single Subject Credential program who have completed their undergraduate degree may complete more than 13 units of the master's program prior to admission under the following conditions: (a) The student must meet the requirements for unconditional admission into the master's program; (b) prior permission from the department Graduate Coordinator must have been obtained.
5. The student will develop a program based upon the curriculum outline that follows, in consultation with the major professor and the department Graduate Coordinator and be approved by the Graduate Studies Analyst.
6. Advancement to Candidacy is required.
7. A candidate completing thesis must submit two final copies for binding in accordance with university regulations and successfully complete a final oral examination covering the thesis and the candidate's area of specialization.
8. The candidate must be enrolled in the university during the quarter of graduation.

CURRICULUM

NON-THESIS

(Open to Agriculture Teachers or Agriculture Credential Candidates Only)

Required Courses

Statistics for Agriculture	FMA	575	(4)
Introduction to Graduate Research	AG	500	(3)
Youth and Adult Programs and Adult Leadership	AGS	505/505L	(2/1)
Internship	AGS	560	(3)
Directed Study	AGS	591	(3)
Educational Computer Technology	GED	507/507L	(4)

Choose one from the following:			(4)
Seminar in Animal Science	AVS	598	(4)
Seminar in Agricultural Biology	AGB	550	3
Seminar in Agronomy	AGR	550	3
Seminar in Horticulture	HOR	550	3

Comprehensive Examination	AGS	697	1
Total Required units			18

Elective Courses

Units to be selected with consent of the student's major professor and graduate committee	(20)
Total Elective units	(20)

Program total

Total units in program	(45)

THESIS

Required Ag Core Courses

Intro to Graduate Research	AG	500	(3)
Design and Analysis of Experimental Research I	AG	510	(3)
Empirical Res. Methods Using Regress. Analysis	AG	520	(3)
Research Proposal	AG	530	(3)
Total Core			(12)

Required Courses

Directed Study	AGS	591	(3)
Special Topics	AGS	599	(4)
Choose one from the following:			(3-4)
Seminar in Animal Science	AVS	598	(4)
Seminar in Agricultural Biology	AGB	550	(3)
Seminar in Agronomy	AGR	550	(3)
Seminar in Food Science	FN	570	(4)
Seminar in Horticulture	HOR	550	(3)
Thesis Research	AGS	694	(6)
Master's Degree Thesis	AGS	696	(6)
Total Required units			(34-35)

Elective Courses

Units to be selected with consent of the student's major professor and graduate committee	(8-9)
Total Elective units	(8-9)

Program total

Total units in program	(45)

GRADUATE COURSE DESCRIPTIONS

AGS 505/505A Young and Adult Programs and Adult Leadership (2/1)

Organization, history, philosophy, administration and procedures in advising of the Future Farmers Association (FFA) chapters and conducting classes for out-of-school youth and adults. Surveys and plans for development of rural and urban adult programs, FFA and Young Farmer programs, techniques and methods. 2 lecture discussions; 1 two-hour activity. Concurrent enrollment required.

AGS 560 Internship (1–3)

On-the-job experience with public and private agencies for graduate students. Professional experience new to the student to enhance the level of competence in agriculture. One unit credit for each 40 hours of experience. Written reports necessary. Approval required before enrolling. Students are permitted to take only 1-3 units per quarter.

FMA 575 Statistics for Agriculture (4)

A summary of statistical tools and techniques used in agriculture. Application of computers to selected statistical techniques. Open to graduate students only. 4 lectures.

AGS 591 Directed Study (1–3)

Individualized study, research, or readings in a specialized area under the direction of a faculty member. May be repeated for a maximum of 4 units. Students are permitted to take only 1- 3 units per quarter.

AGS 599/599A/599L Special Topics for Graduate Students (1–4)

Group study of selected topics, the title to be specified in advance. Instruction by lecture, activity, laboratory or a combination. Prerequisite: permission of major professor and graduate committee.

AGS 692 Independent Study (1–2)

Individualized study, research, or readings in a specialized area proposed by the student and conducted under the direction of a faculty member. May be repeated for a maximum of 4 units. Students are permitted to take only 1-2 units per quarter. Unconditional standing required.

AGS 694 Thesis Research (1–3)

Research conducted in area of specialization under the direction of a faculty member as part of the preparation tor writing a thesis. May be repeated for a maximum of 6 units. Students are permitted to take only 1-3 units per quarter. Unconditional standing required.

AGS 696 Master's Degree Thesis (1–3) (Credit/No credit)

Compilation, evaluation, interpretation, and presentation in thesis form of supervised research. May be repeated for a maximum of 6 units. Students are permitted to take only 1-3 units per quarter. Advancement to Candidacy required.

AGS 697 Comprehensive Examination (1) (Credit/No credit)

Preparation for and completion of the written comprehensive examination. The examination may be taken no more than two times. Failure to complete it satisfactorily the second time will result in termination from the program. Advancement to Candidacy required.

AGS 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Approval of graduate program coordinator is required to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

AGRICULTURE

Master of Science in Agriculture

Animal Science Subplan

www.csupomona.edu/~avs

James Alderson, Chair
Broc Sandelin, Graduate Coordinator

The Master of Science degree program in Agriculture with a subplan in Animal Science provides students the opportunity to enhance their knowledge and competence in a selected area of specialization and encourages individual study and research. The curriculum is designed to expose students to research techniques and the use of scientific literature, and to prepare them for positions of responsibility in animal production, business, or the related animal industries. The attainment of a master's degree also permits qualified candidates to pursue further specialized training, gain entrance to professional schools, or to pursue a Ph.D. degree. The degree program also allows an internship through which students may complement theoretical and technical studies and assure industrial orientation. Students in this program may pursue one of several areas of animal science: animal nutrition, animal breeding, meat science, or physiology.

ADMISSION TO THE PROGRAM

An applicant for admission to the Master of Science program in Animal Science must have a baccalaureate degree in animal science or animal health science and an undergraduate grade point average of 3.0. All thesis applicants must have a major professor within the department that has agreed to serve as their mentor prior to admission. In addition, the Department of Animal and Veterinary Sciences must have received three letters of evaluation from individuals familiar with the applicant's academic qualifications and potential as a graduate student. Applicants not meeting these standards may be conditionally admitted with the approval of the Department of Animal and Veterinary Sciences. The conditional student must comply with the requirements of the conditional admission within two quarters of that admission to the master's program. Students must also comply with any University requirements for admission to a graduate program.

The student along with an appointed advisory committee will develop a program by the end of the second quarter in a selected area of animal science based on the student's interest and preparation. The student's approved program will include required basic core courses, a selection of additional courses in a specialization, electives, independent study, and a thesis.

Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is required for registration in AVS 696 and the awarding of the M. S. degree. In order to advance to candidacy for the Master of Science in Agriculture with the Animal Science subplan, a student must: (1) pass the Graduation Writing Test or have it waived; (2) achieve a GPA of 3.0 (B) or better for at least 35 contract units.

REQUIREMENTS

1. The degree program will include a minimum of 45 quarter units of which at least 24 units shall be in graduate-level courses. Deficiencies in undergraduate preparation must be made up in addition to the 45 quarter units required for the degree.
2. The student will develop a program based upon the curriculum outline that follows, in consultation with the major professor and the graduate advisory committee.
3. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.
4. Achieve Advancement to Candidacy.
5. A grade point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and all graduate courses.
6. The thesis track candidate must complete a formal thesis. The thesis must be presented and defended no later than the 8th week of the quarter in which the candidate expects to graduate. Two copies must be submitted for binding in accordance with university regulations.

   By the end of the second quarter following admission, the student will have assembled a committee and thesis topic with assistance from their major professor.
7. The non-thesis track candidate must satisfactorily complete with at least a B grade a written critical review and corresponding seminar on an approved animal science topic.

   By the end of the second quarter following admission, the student and graduate coordinator or interested faculty member will develop an emphasis area in animal science based on the students interested and available of faculty in said area.
8. A final oral examination covering the thesis project/critical review and the candidate's area of specialization must be successfully completed.
9. The candidate must be enrolled in the university during the quarter of graduation.

CURRICULUM – Thesis Masters

Required courses			
Introduction To Graduate Research	AG	500	3
Design and Analysis of Experimental Research	AG	510	3
or Biological Application of Anova	BIO	575	4
or Research Methods	KIN	590	3
Empirical Research Methods Using			
Regression Analysis	AG	520	3
or Advanced Biometrics	BIO	575	4
or Research Design	KIN	591	3
Research Proposal	AG	530	3
Animal Science Seminar	AVS	598	3
Thesis Research	AVS	694	3-6
Master's Degree Thesis	AVS	696	4
Total Required Courses Units			22-27

Animal Science Specialization Courses

To be selected with consent of the student's major professor and thesis committee 12-18

Elective Courses

To be selected from graduate level courses with consent of the student's major professor and thesis committee 4-8

Program Total **45**

CURRICULUM – Non-Thesis Masters

Required courses

Introduction To Graduate Research	AG	500	3
Design and Analysis of Experimental Research	AG	510	3
Internship	AGS	560	3
Animal Science Seminar	AVS	598	3
Cellular Immunity and Disease	BIO	570	3
Cellular Immunity and Disease Laboratory	BIO	570L	1
Directed Study	AVS	691	3
Independent Study	AVS	692	3
Comprehensive Examination	AG	697	1

Total Required Courses Units. 23

Animal Science Specialization Courses

To be selected with consent of the student's major professor 12-18

Elective Courses

To be selected from graduate level courses with consent of the student's major professor 4-8

Program Total **45**

GRADUATE COURSE DESCRIPTIONS

AVS 512 Nutritional Energetics (4)

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

AVS 513/513L Computer Data Management and Analysis (2/2)

Computer-aided data management and analysis utilizing spreadsheet, database management, text editor, graphical, presentation, and statistical software. Statistical analyses will emphasize the use of SPSS~software. Exploratory data analysis techniques will be studied. The transfer data between various software programs and computer platforms will be investigated. 2 lecture/problem-solving; 2 three-hour laboratories. Concurrent enrollment required.

AVS 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. 3 lecture discussions. Prerequisites: AVS 404/404A and BIO 411.

AVS 520/520L Advanced Topics in Reproductive Physiology (3/1)

Advanced study of the reproductive physiology of domestic animals. Study of the physiological processes of reproduction, from gametogenesis to parturition, for food-producing animals. Recent research into male and female reproductive physiology. 3 lectures, 1 three-hour laboratory. Concurrent enrollment required. Prerequisite: AVS 412 or AVS 414/414L.

AVS 547 Advanced Meat Science (3)

Microstructure and chemistry of skeletal muscle and connective tissue. Chemical and physical changes during the conversion of muscle to meat and their relationship to meat quality and processing. Meat preservation. Analytical methods. 3 lecture discussions. Prerequisites: AVS 427/427L and CHM 321/321L, or consent of instructor.

AVS 550/550L Advanced Topics in Animal Physiology (2/1)

An advanced study of the physiology of domestic farm animals. Recent research developments in animal physiology. Topics include in-depth discussion of the nervous, endocrine, digestive, respiratory, circulatory, and excretory systems. 2 lectures, 1 three-hour laboratory. Concurrent enrollment required. Prerequisite: AVS 350/350L or equivalent.

AVS 560 Graduate Internship in Animal Science (1–4)

On-the-job experiences in areas of animal science that best complement the professional objective of the student. May be repeated for a maximum of 4 units. Prerequisite: consent of internship coordinator.

AVS 598 Animal Science Seminar (1)

Study of selected topics in animal science. 1 seminar. Minimum of 3 units required.

AVS 599/599A/599L Special Topics for Graduate Students (1–4)

Group study of a selected topic, the title to be specified in advance. Instruction is by lecture, laboratory, activity or a combination. Prerequisite: permission of major professor and graduate committee.

AVS 691 Directed Study (1)

Individual research in a specialized area, directed by a faculty member. Work does not pertain directly to the thesis. May be repeated. Maximum credit 4 units. Unconditional standing required.

AVS 692 Independent Study (1)

Research proposed by the student, conducted under the supervision of a faculty member. Work does not pertain directly to the thesis. May be repeated. Maximum credit 4 units. Unconditional standing required.

AVS 694 Thesis Research (1–3)

Individual research pertaining directly to the thesis, under the supervision of the major professor. May be repeated. Maximum credit 9 units. Unconditional standing required.

AVS 696 Master's Degree Thesis (1–3)

Compilation of data culminating in the summarizing and reporting, in approved thesis form, of independent supervised research. Total credit limited to 3 units. Prerequisite or concurrent: AVS 694. Advancement to Candidacy required.

AVS 699 Master's Degree Continuation (0)

Enrollment in this course is for students who have completed all course work but who must be enrolled in the university during the quarter in which they graduate. Advancement to Candidacy required.

AGRICULTURE

Master of Science in Agriculture

Irrigation Science Subplan

www.csupomona.edu/~plantsci

Daniel Hostetler, Chair
Victor Wegrzyn, Graduate Coordinator

The Irrigation Science subplan in the Master of Science in Agriculture allows students to develop knowledge and competence in a specialize area of irrigation and water management. Graduate students may concentrate on enhancing their skills in research methodologies and design and statistical analysis and/or a professional technical track with more emphasis in irrigation system's design and water management and public water conservation programs.

The research track gives students an opportunity to learn and practice biological research methodologies applied to irrigation water use efficiency studies in the context of landscape and/or agriculture irrigation water quality and reclaimed water in irrigation, research into effective water conservation programs. This track will prepare students for technical and research positions within the industry and/or with the sound scientific grounding necessary for continuing on to a Ph.D. program.

The professional track gives the graduate student opportunity to enhance irrigation design skills, advanced irrigation controller system, evaportranspiration (ET), and soil moisture measurement systems, Geographic Information Systems (GIS), Global Positioning System (GPS), plant and soil science and landscape design issues. These students normally do not plan to continue their studies in a research-based Ph.D. program, and would seek employment in the public sector, in education, management, or other non-research industry positions.

Students on both the Research Track and the Professional Track will complete a master's thesis or a project report.

ADMISSION TO THE PROGRAM

An applicant for admission to the Irrigation Science Subplan in the MS degree program in Agriculture should have a baccalaureate degree in agriculture, engineering, landscape architecture, or in a closely related field. Applicants without such a degree will be required to take undergraduate level courses in the Colleges of Agriculture and Science prior to being admitted to the program. A cumulative grade point average of 2.75 overall is required, but at least a 3.0 is preferred in all agriculture and science courses. In addition, three letters of recommendation are required from individuals familiar with the applicant's academic qualifications and potential as a graduate student. All applicants are required to take the Graduate Record Examination General Test. International students seeking admission into the program must present a score of 550 on the TOEFL Exam. An applicant not meeting these standards may be conditionally admitted with the approval of the program's Graduate Admission Committee. The conditional student must comply with the requirements of admission within two quarters.

The student, along with an appointed advisory committee, will develop a program by the end of the second quarter based upon the student's interests and preparation. This will include the selection of a major professor to direct the thesis work. The student's approved program will include required basic core courses, a selection of additional courses in a specialization, electives, independent study, and a thesis. The approved program must be on file by the end of the second quarter of unconditional admission to the program.

Please note that the department has established submission deadlines to allow for sufficient time to consider application packages. Contact the department for these dates.

ADVANCEMENT TO CANDIDACY

Admission to the program does not admit a student to candidacy for the degree. Advancement to Candidacy is contingent upon the recommendation of the Graduate Coordinator and the student's advisory committee. A student who has not been admitted to candidacy is not eligible to register for the thesis/project , (LIS 696). In order to qualify for Advancement to Candidacy for the Master of Science in Agriculture, Subplan in Irrigation Science, a student must: (1) complete at least 24 units of graduate coursework at Cal Poly with a GPA of 3.0 or better, (2) pass the Graduation Writing Test, and (3) with the major professor and Graduate Coordinator, develop and file a program of study. The official program of study must be prepared and submitted for approval no later than the end of the second quarter of attendance.

REQUIREMENTS

1. The degree program shall include a minimum of 45 quarter units of which at least 24 units shall be in graduate level courses. Additional coursework may be required to eliminate subject matter deficiencies. Students may need to complete pre-requisite courses for the graduate courses if they were not completed for the Bachelors degree. These courses would be taken prior to the student being admitted unconditionally to the MS program. Courses at the 300 level may apply toward the fulfillment of degree requirements only with permission of the Graduate Coordinator.
2. A grade point average of 3.0 (B) or better must be maintained in all upper division undergraduate and all graduate courses. No course with a grade lower than "C" (2), may apply toward the fulfillment of degree requirements,
3. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer and/or Extended University and/or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.
4. The student will develop a program based upon the curriculum outline that follow, in consultation with the major professor and the Subplan Graduate Coordinator and with the approval of the Graduate Studies Analyst.
5. Advancement to Candidacy is required.
6. The candidate must complete a graduate formal thesis and submit at least two final copies for binding in accordance with University regulations.
7. A final oral examination covering the thesis and the candidate's area of specialization must be successfully completed.
8. The candidate must be enrolled in the University during the quarter of graduation.

THE CURRICULUM

Required Courses

College Core

Introduction to Graduate Research in the Agricultural Sciences	AG	500	(3)
Design and Analysis of Experimental Research	AG	510	(3)
Empirical Research Methods Using Regression Analysis	AG	520	(3)
Research Proposal	AG	530	(3)
Advanced Principles of Irrigation	LIS	512	(4)
Advance Irrigation System Design	LIS	522	(4)
Advanced Topics in GPS/GIS Application in Irrigation/Horticulture and Agriculture	LIS	550	(4)
Thesis/Project Research	LIS	694	(1-6)
Masters Degree Thesis/Project	LIS	696	(1-6)

Subtotal. 26-36

Elective Courses

To be selected from the following list with consent of the student's major professor and graduate committe 7-17

Graduate Independent Study	LIS	692
Advanced Geographic Information Systems I	GEO	442/442A
Advanced Geographic Information Systems II	GEO	443/443A
Seminar in Water Resource Economics	EC	439
Agricultural Water Resource Management	ABM	450
Fresh Water Biology	BIO	430/430L
Meteorology	ESC	304
Seminar in Horticulture	HOR	550
Seminar in Agronomy	AGR	550
Foundations of Landscape Design	LA	510/510L

Total units required for the master's degree 45

GRADUATE COURSE DESCRIPTIONS

LIS 512 Advanced Principles of Irrigation (4)

Advanced studies in methods of estimating evapotranspiration (ET), methods of soil moisture measurement, and estimating irrigation efficiency to both landscape and agricultural applications. 4 lecture discussions. Prerequisite: graduate standing.

LIS 522 Advanced Irrigation System Design (4)

Advanced irrigation system design system hydraulics including looped piping systems, software for sprinkler head placement, water distribution metrics, pumping units and controls, and irrigation system computer controls. 4 lecture discussions. Prerequisites: LIS 231 or LIS 340, or consent of instructor.

LIS 550 Advanced Topics in Irrigation (4)

Analysis and discussion based on literature, recent research advancements, regulations and public policy. 4 lecture discussions. Prerequisite: unconditional graduate standing.

LIS 692 Graduate Independent Study (1–4)

Independent research and study on an irrigation and water management study chosen by the student with the consultation and approval of an advisor. May include research proposal writing to fund the research project. Prerequisite: permission of major professor .

LIS 694 Thesis/Project Research (1–6)

Research conducted as part of the preparation for writing a thesis or preparing a graduate project. May be repeated for a maximum of 6 units. Prerequisite: unconditional graduate standing.

LIS 696 Masters Degree Thesis/Project (1–6)

Compilation, evaluation, interpretation, and presentation in thesis or project form of supervised research. Open only to unconditional graduate students with the approval of the graduate advisor. May be repeated for a maximum of 6 units. Students are permitted to take 1-3 units per quarter.

LIS 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Approval of graduate program coordinator is required to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

AGRICULTURE

Master of Science in Agriculture

Nutrition and Food Science Subplan

www.csupomona.edu/~hnfs

Douglas S. Lewis, Department Chair
Bonny Burns-Whitmore, Graduate Coordinator

The Master of Science in Agriculture with the subplan in Nutrition and Food Science offers interdisciplinary in-depth study of the principles and application of nutritional and food sciences. The program is structured with Thesis and Non-Thesis tracks. Both tracks meet the objectives of both the generalist and those seeking specialization in one of the following areas: nutritional biochemistry, community nutrition, clinical nutrition, or food science. Students in both the Thesis and Non-Thesis tracks will acquire skills to pursue careers in teaching, research industry, Students in the Thesis track will be prepared for advanced graduate studies. The teaching format includes lectures, discussions, research methods, evaluation of scientific literature, laboratory work, and independent research.

ADMISSION TO THE PROGRAM

An applicant for admission to the Master of Science program in Nutrition and Food Science must have a baccalaureate degree in Foods and Nutrition or a baccalaureate degree with a minimum of 24 quarter units of courses in any biological science area, or nutrition, or food science related major; and 12 units in closely related areas such as biochemistry, physiology, or microbiology from an accredited university. Science classes, (i.e. physiology, biochemistry, microbiology) will include a minimum of 3 hours laboratory experience per week. An undergraduate grade point average of 3.0 and the GRE are required for unconditional admission. Graduates of foreign institutions should have a TOEFL score of 580 or better. In addition, the Department of Human Nutrition and Food Science must be in receipt of three letters of recommendation from individuals familiar with the applicant's academic qualifications and potential as a graduate student. Applicants not meeting these standards may be conditionally accepted and must meet the requirements for unconditional admission within two quarters of their acceptance into the master's program. Admission to the program does not admit a student to candidacy for a degree.

REQUIREMENTS

1. ADVISORY COMMITTEE

Non-Thesis Track:
By the end of the second quarter following admission, the student and the graduate coordinator or interested faculty member will develop an emphasis area in nutrition based on the student's interest and preparation. The student's approved program will include required core courses, a selection of additional courses in a specialization, electives, a topic for a publishable critical review of contemporary nutrition or food science area and a seminar on that area.

Thesis Track:
By the end of the second quarter following admission the student and the major professor will develop an academic program and research project in a selected area of nutrition or food science. The major professor and the student will establish a Thesis committee to include not less than 2 other faculty members or equivalent persons holding terminal degrees such as a DVM or MD. The student's approved program will include required core courses, a selection of additional courses in a specialization, electives, and a Thesis.

2. The degree program shall include a minimum of 45 quarter units of which at least 24 units shall be in graduate 500 and 600-level courses. Deficiencies in undergraduate preparation must be made up in addition to the 45 quarter units required for the degree.
3. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.
4. A grade point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and all graduate courses. A grade point average of 3.0 (B) or better must be maintained in all core courses.
5. Pass the Graduation Writing Test (http://www.csupomona.edu/~academic/testcenter/gwt.shtml
6. The Thesis track candidate must complete a formal thesis. The thesis must be presented and defended no later than the ninth week of the quarter in which the candidate expects to graduate. Two copies must be submitted for binding in accordance with university regulations, one is to be submitted to the Department of Human Nutrition and Food Science.
7. The Non-Thesis track candidate must satisfactorily complete with at least a B grade, a written publishable critical review and corresponding seminar on an approved contemporary nutrition problem.
8. The candidate must be enrolled in the university during the quarter of graduation.

REQUIRED CORE COURSES

Introduction to Graduate Research	AG	500	(3)
Design and Analysis of Experimental Research	AG	510	(3)
Empirical Research Methods Using Regression Analysis	AG	520	(3)
Research Proposal (Thesis track only)	AG	530	(3)
Advanced Nutrition	FN	533	(3)
or Advanced Food Chemistry	FN	520	(3)
Seminar	FN	570	(2)
Total			(17

Non-Thesis – 26 units

Recent Advances in Nutrient Metabolism: Carbohydrates	FN	535	(3)
Recent Advances in Nutrient Metabolism: Lipids	FN	535	(3)
Recent Advances in Nutrient Metabolism: Proteins	FN	535	(3)
Recent Advances in Nutrient Metabolism: Vitamins and Minerals	FN	535	(3)
Advanced Life Cycle Nutrition	FN	536	(3)

Comprehensive exam	AG	697	(1)
Electives			(10)
Total			(26)

Thesis –Nutrition Specialization–26 units

Recent Advances in Nutrition Metabolism*	FN	535	(6)
Presentation of Research Proposal	FN	693	(1)
Thesis Research	FN	694	6)
Masters Degree Thesis	FN	696	(3)
Electives			(10)
Total			(26)

Thesis –Food Science Specialization–26 units

Presentation of Research Proposal	FN	693	(1)
Thesis Research	FN	694	(6)
Master's Degree Thesis	FN	696	(3)
Electives			(16)
Total			(26)

* Choose at least two from five different topics; see course descriptions for more information.

Nutrition and Food Science: Suggested Courses

Current Topics in Clinical Practice	FN	545	(2)
Epidemiology	MIC	330	(3)
General Virology	MIC	430/430L	(3/2)
Hematology	MIC	444/444L	(3/1)
Human Genetics	BIO	403/403L	(3/1)
Population Genetics	BIO	445/445L	(3/1)
Concepts of Molecular Biology	BIO	450	(3)
Molecular Biology Techniques	BIO	451/451L	(1)
Bioinformatics	BIO	459/459L	(4)
Scientific Communication	BIO	490	(1)
Endocrinology	BIO	520/520L	(3/1)
Renal Physiology	BIO	521	(3)
Molecular Biology of Development	BIO	555	(4)
Cellular Immunity and Disease	BIO	570/570L	(3/1)
Research Methods	KIN	590	(3)
Research Design	KIN	591	(3)
Advanced Physiology of Exercise	KIN	683/683L	(3/1)
Advanced Concepts in Exercise Testing and Counseling	KIN	684	(3)

Food Science: Suggested Courses

Meat	AVS	327/327L	(3/1)
Seafood and Poultry Processing Technology	AVS	328/328A	(3/1)
Nutritive Analysis	AVS	424	(2)
Meat Processing and Technology	AVS	427/427L	(3/2)
Applied Thermodynamics	ETM	306	(4)
Applied Heat Transfer	ETM	308	(3)
Machine Elements/Laboratory	ETM	315/325L	(3/1)
Applied Total Quality Management	ETP	300	(3)
Industrial Safety	ETP	302	(3)
Quality Assurance	ETP	375	(3)
Polymer Chemistry	CHM	409	(3)
Chemical Thermodynamics	CHM	415	(3)
Solution Equilibria in Analytical Chemistry	CHM	421	(2)
Enzymology	CHM	451/451L	(3/1)

These are not all-inclusive courses. Students may choose others in consultation with their graduate advisor.

Nutrition and Food Science Specialization courses to be selected with consent of the student's major professor from 300, 400, 500 and 600 level courses with no more than 21 units from 300 and 400 level courses.

GRADUATE COURSE DESCRIPTIONS

FN 533 Advanced Nutrition (3)

Study of the experimental basis for determination of the Dietary Recommended Intakes (DRIs). Evaluation of the interrelationships between metabolism, physiology, and genetics with nutrient requirements. The role of the DRIs in preventing nutritional inadequacy and prevention of chronic disease will be examined. Written exams and oral presentations. 3 lecture/discussions. Prerequisites: FN 433, 434, and 435 or equivalent or permission of instructor.

FN 535 Recent Advances in Nutrient Metabolism (3)

One of the 5 major nutrient classes (proteins, fats, carbohydrates, vitamins, minerals) will be studied each quarter. Each course will be subtitled identifying the nutrient class to be discussed. May be repeated for a total of 15 units. 3 lecture/discussions. Prerequisites: FN 433, 434, and 435 or equivalent.

FN 536 Advanced Life Cycle Nutrition (3)

Discussion of how developmental physiology and cellular growth and differentiation influence nutrient requirements during pregnancy and lactation, fetal growth, infancy, premature birth, childhood, adolescence and old age. Planning nutrition programs to meet the nutrient needs of at-risk women, infants and children. Review of the nutritionally relevant chronic diseases with age. Oral presentation and discussion of the scientific literature dealing with the life cycle. 3 lecture/discussions. Prerequisite FN 434 or permission of instructor.

FN 540 Field Experience (2)

Supervised experience in various areas determined by graduate advisor. Prerequisite: consent of advisor.

FN 543 Diet Therapy (3)

Study of the physiological and biochemical changes imposed on the body by certain diseases and dietary modifications used for treatment. Adaptation of dietary patterns of individuals to special needs of disease states and preventive care. 3 lecture discussions. Prerequisite: FN 433, FN 434, FN 435 or equivalent and completed dietetics internship.

FN 545 Current Topics in Clinical Practice I, II, III (2)

Presentations by professionals on selected topics. Student case presentations. May be repeated up to a maximum of 6 units. To be taken concurrently with FN 560 Clinical Practice. Prerequisite: acceptance into Dietetic Internship.

FN 550 Independent Study (1–2)

Individual investigation and original study to be conducted in a field of interest selected by the student with consent of advisor. Designed to meet individual student needs. Maximum of 2 units may be earned.

FN 560 Clinical Practice I, II, III (4)

Supervised preprofessional practice in an assigned clinical site. May be repeated for credit up to a maximum of 12 units. To be taken concurrently with FN 545 Introduction to Clinical Practice. Prerequisite: acceptance

into Dietetic Internship. No master's degree credit given.

FN 570 Seminar (2)

Study of selected topics in nutrition and food science. Each seminar subtitled to describe its emphasis. Total credit limited to 4 units. 2 seminars. Prerequisite: graduate standing.

FN 599/599A/599L Special Topics (1–3)

Group study of a selected topic in nutrition or food science and technology which is specified in advance for graduate students. Total credit limited to 3 units. Instruction is by lecture, laboratory, activity, or a combination. Prerequisite: permission of instructor.

FN 685/KIN 685 Nutrition in Sports and Exercise (4)

Knowledge concerning the role of nutrients in optimizing human performance. Assessment of caloric and nutrient requirements associated with exercise. Special consideration is given to gender specific needs of athletes, nutritional ergogenic aids, and eating disorders. 4 seminars. Prerequisites: KIN 683/683L and FN 533.

FN 691 Directed Study (1–2)

Individualized research in a specialized area under the direction of a faculty member which may or may not lead to a thesis. Maximum credit 2 units.

FN 692 Independent Study (1–2)

Individual investigation and original study to be conducted in a field of interest selected by the student under the supervision of a faculty member. Study may not lead to a thesis. Maximum credit 2 units. Unconditional standing required.

FN 693 Presentation of Research Proposal (1)

A public oral presentation and discussion of a written proposed research plan for the master's thesis. Required for Advancement to Candidacy. Prerequisites: AG 500 or equivalent with consent of graduate coordinator or thesis advisor. Unconditional standing required.

FN 694 Thesis Research (1–6)

Individual research in an area of specialization conducted as part of the preparation for writing a thesis under the direction of graduate faculty. Maximum credit 6 units. Unconditional standing required. Must have completed FN 693.

FN 696 Master's Degree Thesis (3)

Compilation of data culminating in the summarizing and reporting, in thesis form, of independent supervised research. Maximum credit 3 units. Advancement to Candidacy required.

FN 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Approval of graduate program coordinator is required to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

AGRICULTURE

Master of Science in Agriculture

Plant Science Subplan

www.csupomona.edu/~plantsci

Daniel G. Hostetler, Chair
Victor Wegrzyn, Graduate Coordinator

The Plant Science Subplan in the Master of Science in Agriculture allows students to develop knowledge and competence in a specialized area of agricultural biology, agronomy, horticulture or soil science through individualized study and research. The program is designed to build upon a strong background in the physical, natural and agricultural sciences. Graduate students may concentrate on enhancing their skills in research methodology and design and statistical analysis, or they may choose to apply their specialized study in an education, management and/or public policy. The Subplan in Plant Science allows students to pursue the degree under two different tracks. The Research Track will provide students with the opportunity to gain expertise in biological research methodologies as applied to plant, soil and entomological problems. This degree will prepare students for technical and research positions within the industry and/or with the sound scientific grounding necessary for continuing on to a Ph.D. program. The Professional Track provides an opportunity for students who wish to combine graduate courses in the plant, soil and entomological sciences with interdisciplinary preparation in design, business management, communications, public policy or the social sciences. These students normally do not plan to continue on in a research-based Ph.D. program, and would seek employment in the public sector in education, management, or other non-research industry positions.

Students on both the Research Track and the Professional Track will complete a master's thesis.

ADMISSION TO THE PROGRAM

An applicant for admission to the Plant Science Subplan in the M.S. degree program in Agriculture should have a baccalaureate degree in agricultural biology, agronomy, horticulture or soil science, or in a closely related field. Applicants without such a degree will be required to take undergraduate level courses in the Colleges of Agriculture and Science prior to being admitted to the program. A cumulative grade point average of 2.75 overall is required, but at least a 3.0 is preferred in all agriculture and science courses. In addition, three letters of recommendation are required from individuals familiar with the applicant's academic qualifications and potential as a graduate student. All applicants are required to take the Graduate Record Examination General Test. International students seeking admission into the program must present a score of 550 on the TOEFL Exam. An applicant not meeting these standards may be conditionally admitted with the approval of the program's Graduate Admission Committee. The conditional student must comply with the requirements of admission within two quarters.

The student, along with an appointed advisory committee, will develop a program by the end of the second quarter based upon the student's interests and preparation. This will include the selection of a major professor to direct the thesis work. The student's approved program will include required basic core courses, a selection of additional courses in a specialization, electives, independent study, and a thesis. The approved program must be on file by the end of the second quarter of unconditional admission to the program.

Please note that the department has established submission deadlines to allow for sufficient time to consider application packages. Contact the department for these dates.

Advancement to Candidacy

Admission to the program does not admit a student to candidacy for the degree. Advancement to Candidacy is contingent upon the recommendation of the Graduate Coordinator and the student's advisory committee. A student who has not been admitted to candidacy is not eligible to register for the thesis/project (HPS 696). In order to qualify for Advancement to Candidacy for the Master of Science in Agriculture, Subplan in Plant Science, a student must: (1) complete at least 24 units of graduate coursework at Cal Poly with a GPA of 3.0 or better, (2) pass the Graduation Writing Test, and (3) with the major professor and Graduate Coordinator.

Requirements

1. The degree program shall include a minimum of 45 quarter units of which at least 24 units shall be in graduate level courses. Additional coursework may be required to eliminate subject matter deficiencies. Courses at the 300 level may apply toward the fulfillment of degree requirements only with permission of the Graduate Coordinator.
2. A grade point average of 3.0 (B) or better must be maintained in all upper division undergraduate and all graduate courses. No course with a grade lower that "C" (2.0) may apply toward the fulfillment of degree requirements.
3. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more that 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer and/or Extended University and/or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.
4. The student will develop a program based upon the curriculum outline that follows, in consultation with the major professor and the department Graduate Coordinator and with the approval of the Graduate Studies Analyst.
5. Advancement to Candidacy is required.
6. The candidate must complete a graduate formal thesis and submit at least two final copies for binding in accordance with University regulations.
7. A final oral examination covering the thesis and the candidate's area of specialization must be successfully completed.
8. The candidate must be enrolled in the University during the quarter of graduation.

THE CURRICULUM – THESIS TRACK

Required courses

College Core

Introduction to Graduate Research in the Agricultural Sciences	AG	500	(3)
Design and Analysis of Experimental Research I	AG	510	(4)
Empirical Research Methods Using Regression Analysis	AG	520	(4)
Research Proposal	AG	530	(3)
Presentation of Research Proposal	HPS	594	(1)

3 seminar courses from the following:

Seminar in Agricultural Biology	AGB	550	(3)
Seminar in Agronomy	AGR	550	(3)
Seminar in Horticulture	HOR	550	(3)
Seminar in Soil Science	SS	550	(3)

Advanced Topics in Agriculture	AG	550	(1-4)
Total			(9)
Thesis/Project Research	HPS	694	(1-4)
and Master's Degree Thesis/Project	HPS	696	(1-4)

Elective courses

To be selected with consent of the student's major professor and graduate committee . . . . . (13-19)

Total . . . . . (45)

THE CURRICULUM – NON-THESIS TRACK

Required courses

College Core

Introduction to Graduate Research in the Agricultural Sciences	AG	500	(3)
Design and Analysis of Experimental Research I	AG	510	(4)
Empirical Research Methods Using Regression Analysis	AG	520	(4)
Research Proposal	AG	530	(3)
Comprehensive Examination	AG	697	(1)

3 seminar courses from the following:

Seminar in Agricultural Biology	AGB	550	(3)
Seminar in Agronomy	AGR	550	(3)
Seminar in Horticulture	HOR	550	(3)
Seminar in Soil Science	SS	550	(3)
Advanced Topics in Agriculture	AG	550	(1-4)
Total			(9)

Elective courses

To be selected with consent of the student's major professor and graduate committee . . . . . (21)

Total . . . . . (45)

GRADUATE COURSE DESCRIPTIONS

HPS 500 Introduction to Graduate Research in the Plant Sciences (2)

Principles, tools and techniques used in scientific research as applied to the plant and environmental sciences. Topics will include the development of literature reviews and annotated bibliographies, appropriate literature citation, on-line research methods and sources, the identification and definition of a research topic and its rationale. Readings, discussions, computer applications, and research. Two seminars.

HPS 510 Advanced Topics in the Plant and Environmental Sciences (3)

Advanced study of topics related to agronomy, horticulture, soil science and economic entomology. To include perspectives on plant biotechnology, trends in public policy related to environmental regulation, and advances in plant nutrition and soil management. Recent research in the field will be examined. Reading and reports on papers in the literature. 1 three-hour seminar. Prerequisite: unconditional graduate standing.

PLT 550 Seminar in Plant Science (3)

Analysis and discussion of a selected topic in plant science based upon examination of the current literature, recent research advancements, and exposure to professional issues. Subject matter topic for course rotates. May be repeated once for credit in two different topics. 1 three-hour seminar.

HPS 591 Directed Study (1–2)

Individualized study, research, or readings in a specialized area under the directed of a faculty member. May be repeated for a maximum of 4 units. Students are permitted to take only 1-2 units per quarter.

HPS 594 Presentation of Research Proposal (1)

A public, oral presentation and discussion of a proposed research plan for the master's thesis. The student will develop and present, with the aid of the major professor, the scientific and statistical hypotheses, research design, proposed analytical methodologies, as well as a substantial selection from the literature review demonstrating the need and validity of the proposed thesis study. Required for Advancement to Candidacy. Unconditional graduate standing required.

HPS 692 Graduate Independent Study (1–4)

Independent study and research on a subject chosen by the student with the consultation, approval, and direction of an advisor. Course may be repeated. Maximum credit: 6 units. Unconditional graduate standing required.

HPS 694 Thesis/Project Research (1–3)

Research conducted as part of the preparation for writing a thesis or preparing a graduate project. Open only to unconditional graduate students with the approval of the graduate advisor. May be repeated for a maximum of 6 units. Students are permitted to take only 1-3 units per quarter.

HPS 696 Master's Degree Thesis/Project (1–3)

Compilation, evaluation, interpretation, and presentation in thesis or project form of supervised research. May be repeated for a maximum of 6 units. Students are permitted to take only 1-3 units per quarter.

HPS 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Approval of graduate program coordinator is required to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

COLLEGE OF BUSINESS ADMINISTRATION

www.cba.csupomona.edu/graduateprograms

Richard S. Lapidus, Dean
Vicki S. Peden, Associate Dean
_____, Associate Dean

GRADUATE PROGRAMS

MASTER OF SCIENCE IN ACCOUNTANCY

MASTER OF BUSINESS ADMINISTRATION (MBA)

Emphases in:

Accounting
Entrepreneurship
Finance
Hospitality Management
Human Resources Management
Information Management
International Business
Marketing
Technology and Operations Management

MASTER OF SCIENCE IN BUSINESS ADMINISTRATION

Subplan in:

Information Systems Auditing

MASTER OF BUSINESS ADMINISTRATION

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 the 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 skills in interpersonal relations; and 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.

ADMISSION TO THE PROGRAM AND REQUIREMENTS

After a prospective student has submitted the 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 upon the recommendation of the College of Business Administration Associate Dean. Selection will be on the basis of evidence of ability to perform at a high academic level. The following criteria are considered: the undergraduate grade-point average, scores on the Graduate Management Admissions Test (GMAT), managerial work experience, letters of recommendation and the applicant's personal statement.
2. A minimum GMAT score of 450 is required to be considered for admission to the program.
3. A TOEFL score of 237 Computer Based, 580 Paper Based, 92 Internet Based, or better is required for admission of international students to the program.
4. First-year program courses may be waived if equivalent courses have been successfully completed or proficiency in the subject matter can be demonstrated. Waiver will be granted on recommendation of the Associate Dean.
5. No more than 13 units of acceptable graduate credit may be transferred from another AACSB accredited graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.
6. A degree requirements worksheet will be prepared by the Graduate Business Programs Office when the student is admitted. An official degree program will be finalized prior to the completion of the second quarter. It will be approved by the Graduate Business Programs Office and verified by the Graduate Studies Analyst.
7. A grade-point average of 3.0 (B) 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 meet all prerequisite requirements before enrolling in 600-level courses.
9. To advance to candidacy for the MBA, MSA, or MSBA degree, a student must: (a) achieve unconditional standing; (b) complete at least 12 units of graduate coursework at Cal Poly Pomona with a GPA of 3.0 or better; (c) pass the Graduation Writing Test; and, (d) have an approved program of study on file.
10. The candidate must be enrolled in the university during the quarter of graduation.

MBA PROGRAM

CURRICULUM

Prerequisite Courses

First Year

Business Economics	EC	521	(4)
Financial Accounting	GBA	510	(4)
Managerial Statistics	GBA	514	(4)
Essentials of Marketing Management	GBA	517	(4)
Legal Environment of Business	GBA	530	(4)
Production and Operations Management	GBA	531	(4)
Organizational Management, Principles and Behavior	GBA	535	(4)
Fundamentals of Financial Management	GBA	546	(4)
Management Information Systems	GBA	547	(4)
Total, First Year			(36)

Required Courses

Second Year

Managerial Accounting for Decision Making	GBA	608	(3)
Directed Study in Managerial Accounting	GBA	609	(1)
Seminar in Organizational Behavior	GBA	615	(3)
Directed Study in Organizational Behavior	GBA	616	(1)
Management Science Seminar	GBA	628	(3)
Directed Study in Management Science	GBA	629	(1)
Financial Decision Making	GBA	645	(3)
Directed Study in Financial Decision Making	GBA	646	(1)
Marketing Seminar	GBA	652	(3)

Directed Study in Marketing Seminar	GBA	653	(1)
Management Seminar	GBA	671	(3)
Directed Study in Management Seminar	GBA	672	(1)
Information Systems Seminar	GBA	673	(3)
Directed Study in Information Systems Seminar	GBA	674	(1)
Business Research Methods	GBA	683	(3)
Directed Study in Business Research Methods	GBA	684	(1)
Strategic Management	GBA	687	(3)
Directed Study in Strategic Management Strategies Practicum	GBA	688	(1)
Sub-total			(36)

Elective Courses-MBA Program

Select 8 units from the following list:

Information Systems Analysis and Design	GBA	522	(4)
Information Systems Implementation and Programming	GBA	524	(4)
Fundamentals of Contracts and Administration	GBA	532	(4)
Analysis of Key Federal Contract Elements: Price/Cost	GBA	552	(4)
Database Design and Processing	GBA	554	(4)
Computer-Based Data Communications	GBA	557	(4)
Legal Environment of Information Systems	GBA	560	(4)
Strategic HR Management	GBA	562	(4)
Executive Development	GBA	563	(4)
Creativity and Innovation	GBA	564	(4)
Professional Presentations Using Technology	GBA	565	(3)
Directed Study in Professional Presentations Using Technology	GBA	566	(1)
Internet Technologies for Business & Communication	GBA	567	(4)
Creating a Business Plan	GBA	570	(4)
Venture Growth & Financing	GBA	571	(4)
Family Business	GBA	573	(4)
Promotional Consultancy	GBA	574	(4)
Advanced IS Auditing	GBA	577	(4)
Security and Privacy of Information Systems	GBA	578	(4)
Introduction to Real Estate Analysis and Valuation	GBA	580	(4)
Special Topics for Graduate Students	GBA	599	(4)
Global Telecommunications	GBA	607	(4)
Financial Markets and Institutions	GBA	610	(3)
Directed Studies in Financial Markets and Institutions	GBA	611	(1)
Telecommunications Policy	GBA	613	(4)
Network Management and Design	GBA	614	(4)
Management-Union Relations	GBA	617	(4)
International Business	GBA	620	(4)
Federal Government Contract Cases, Appeals and Jurisdiction	GBA	630	(4)
Promotion Management	GBA	633	(4)
Sales Productivity	GBA	634	(4)
Motivation and Market Behavior	GBA	635	(4)
Project Management	GBA	636	(3)
Directed Study in Project Management	GBA	637	(1)
Quality Management	GBA	640	(3)
Directed Study in Quality Management	GBA	641	(1)
Security Analysis and Portfolio Management	GBA	647	(3)
Directed Study in Security Analysis and Portfolio Management	GBA	648	(1)
Business Forecasting	GBA	654	(3)
Directed Study in Business Forecasting	GBA	655	(1)
Financial Modeling	GBA	656	(4)
Financial Derivatives	GBA	657	(4)
Advanced Topics in International Business and Law	GBA	658	(4)
Human Interaction Skills Laboratory	GBA	665	(4)
Organizational Development	GBA	667	(4)
Real Estate Finance and Investment	GBA	680	(4)
Directed Study	GBA	691	(1-9)
Independent Study	GBA	692	(1-4)
Sub-total			(8)

With consent of the Graduate Business Programs Office up to 8 units of approved 400-level courses in business or economics may be selected as electives.

Terminal Option

Choose I or II (4 units)

Option I

Business Research Project	GBA	695	(4)

Option II

Master's Degree Thesis	GBA	696	(4)
Sub-total			(4)
TOTAL UNITS, Second Year			(48)

THE CAREER MBA PROGRAM

The Career MBA Program is designed for students who wish to emphasize a particular functional area of business. A set of courses appropriate to the career goal is selected by the student and the appropriate Graduate Faculty Advisor with the approval of the Associate Dean.

Admission to the program and other requirements are identical to those of the regular MBA. Students may change to the Career MBA or MBA at any time, but are encouraged to decide early in order to avoid taking courses for which credit cannot be given. Students with an undergraduate business major are, generally, advised not to emphasize the same area in the MBA.

The program consists of 48 units of coursework designed to ensure broad competence in management, in technical skills and in human relations as well as in the area of specialization. Current curriculum sheets for each emphasis as well as information on Graduate Faculty Advisors are available in the Graduate Business Programs Office. Students may choose one of the following emphases:

Accounting

Provides emphasis on public accounting, management accounting, or internal auditing (with the possibility of preparing for certification); or, in the areas of government and not-for-profit accounting or taxation. Intermediate accounting courses may be required for no graduate credit for some of these tracks, and are recommended for all.

Entrepreneurship

For those interested in founding their own business or working effectively in the fast-changing world of growing companies. In addition to the emphasis on start-up companies and small business management, this concentration examines the strategies used in larger corporations to tap the entrepreneurial spirit.

Finance

Provides specialization in the areas of financial analysis, the management of financial institutions, security analysis, and multi-national finance.

Hospitality Management

Designed for managers who desire an MBA with a management operations theme in the hospitality industry. The Collins College of Hospitality Management (rated one of the top-five hospitality management programs in North America) offers the hospitality emphasis with courses in management, strategy, leadership, operations analysis, multi-unit management, and information systems.

Human Resource Management

Covers such areas as employee selection, training and development, benefits programs, compensation, legal requirements, and personnel problems in diverse organizations. Prepares individuals for a variety of careers in the human resources field.

Information Management

For the individual who has earned an undergraduate degree in a non computer field. Provides an understanding of computer systems as well as the systems development process via the tools and skills necessary to be an intelligent user of computer resources and/or to manage a satellite computer installation within a user department. Not designed for individuals who wish to be programmer/analysts, project leaders, or managers of information systems at the corporate level.

International Business

Provides knowledge and expertise in international business needed to allow students to work for and/or with multinational firms. Students will be introduced to the global economic environment and the complexities of multinational sources of supply, markets, and funding. Many graduates will apply their business skills to careers in international trade.

Marketing

Provides for specialization in marketing, the business function that identifies unfulfilled needs and wants, defines and measures their magnitude, determines which target markets the organization can best serve, decides on appropriate products, services, and programs to serve these markets, and calls upon everyone in the organization to "think and serve the customer." Students who complete this emphasis will develop the skills and knowledge needed to become marketing managers and aid their organizations in achieving marketing objectives.

Technology and Operations Management

Provides basic knowledge and expertise for students with career interests in the management of manufacturing and service operations. A broad selection of course offerings permits students to tailor their program in the areas of Supply Chain Management, Enterprise Resource Planning, E-business, lean operations, project management (PERT/CPM), quality assurance (Six Sigma), purchasing, forecasting, facilities management, and quantitative methods (simulation modeling and management science).

MASTER OF SCIENCE IN BUSINESS ADMINISTRATION

The College of Business Administration offers a Master of Science in Business Administration for the student with a business degree who wishes to specialize in a concentrated area of coursework. The subplan in Information Systems Auditing is intended for students who wish to pursue a career in this area.

ADMISSION TO THE PROGRAM

1. Admission to the MSBA program will be granted upon the recommendation of the College of Business Administration Associate Dean. Selection will be on the basis of evidence of ability to perform at a high academic level. An applicant shall have a bachelor's degree in business from an accredited college or university. The following criteria are considered: undergraduate grade-point average, scores on the Graduate Management Admissions Test (GMAT), managerial work experience, letters of recommendation, and applicant's personal statement.
2. A minimum GMAT score of 450 is required to be considered for admission to the program.
3. A TOEFL score of 237 Computer Based, 580 Paper Based, 92 Internet Based, or better is required for admission of international students to the program.
4. A program worksheet of the degree requirements will be prepared by the Graduate Business Programs Office when the student is admitted. During the second quarter of attendance and prior to the student's advancement to candidacy, an official degree program will be prepared. It will be approved by the Associate Dean and verified by the Graduate Studies Analyst.

REQUIREMENTS

1. The degree program must include a minimum of 45 quarter units. No more than 13 units of acceptable graduate credit may be transferred from another AACSB accredited graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.

   A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.
2. 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.
3. Advancement to Candidacy must be achieved.
4. The candidate must fulfill the terminal requirement of a comprehensive examination or a business research project.
5. The candidate must be enrolled in the university during the quarter of graduation.

MSBA SUBPLAN IN INFORMATION SYSTEMS AUDITING

The MSBA subplan in Information Systems Auditing is intended primarily for individuals with an interest in pursuing a career in IS auditing. The program is for business decision-makers, information systems technical specialists, information systems managers, and professionals in accounting, IS auditing, and other disciplines who wish to develop a better awareness of this field and how it can assist their organization. The objectives of the program are: to develop the ability to plan and conduct audits of the IS function; to develop the capability of reporting to management the findings reached; to prepare students for careers in the IS auditing profession; and to provide the necessary background for doctoral study and continued, self-directed study.

CURRICULUM

Due to the technical orientation of the IS Auditing subplan, a strong background in accounting and information systems is required. Before a student can be advanced to candidacy, deficiencies in any of the subject matter listed below must be removed.

Required for Admission to the Program

Information Systems Analysis and Design	GBA	522	(4)
Information Systems Implementation and Programming	GBA	524	(4)
Total			(8)

The program of study for the MSBA in IS Auditing will consist of 48 required units and 1-4 units of Terminal Option.

Required Courses MSBA Common Core

Managerial Accounting for Decision Making	GBA	608	(3)
Directed Study in Managerial Accounting for Decision Making	GBA	609	(1)
Seminar in Organizational Behavior	GBA	615	(3)
Directed Study in Organizational Behavior	GBA	616	(1)
Financial Decision Making	GBA	645	(3)
Directed Study in Financial Decision Making	GBA	646	(1)
Strategic Management	GBA	687	(3)
Directed Study in Strategic Management	GBA	688	(1)
Sub-total			(16)

Required Courses in the IS Auditing Subplan

IS Auditing	CIS	433	(4)
Computer Based Data Communications	GBA	557	(4)
Legal Environment of Information Systems	GBA	560	(4)
Advanced IS Auditing	GBA	577	(4)
Security and Privacy of Information Systems	GBA	578	(4)
Computer Forensics	CIS	481	(4)
Information Systems Seminar	GBA	673	(3)
Directed Study in Information Systems	GBA	674	(1)
MSBA Option Project	GBA	685	(4)
Sub-total			(32)

Terminal Option
Comprehensive Exam

Students are required to take the GBA 697 (1) Comprehensive Exam. If a student does not pass the comprehensive exam, then they have two options: 1) take the comprehensive exam for a second and final time, or 2) complete a Master's Degree Project, GBA 695 (4). Students who fail the comprehensive exam after two attempts will not receive their MSBA degree.

GRADUATE COURSE DESCRIPTIONS

GBA 510 Financial Accounting (4)

Accounting principles used in the collection, interpretation, and use of financial data from the standpoints of creditors, investors, and management. 4 lecture discussions.

GBA 514 Managerial Statistics (4)

Decision making using classical techniques, non-parametric tests, Bayesian analysis, utility theory, index numbers, and time-series analysis. Sampling and sampling distributions, estimation, hypothesis-testing, variance analysis, regression, correlation and multiple regression. 4 lecture discussions. Prerequisite: STA 120, equivalent, or consent of instructor.

GBA 517 Essentials of Marketing Management (4)

Development of marketing strategy to identify and serve the needs of an organization's markets and publics. Concepts relating to the analysis, planning, implementation and control of marketing strategy involving product, promotion, pricing and distribution decisions made within an external environmental context. 4 lecture discussions.

GBA 522 Information Systems Analysis and Design (4)

Introduction to object-oriented analysis and design of computer information systems. The system life cycle and its business environment. Case studies using event analysis, data dictionary, normalization and data modules. Class hierarchies, structures, and collaboration of objects. User/computer interface design. 4 lectures/problem solving.

GBA 524 Information Systems Implementation and Programming (4)

Introduction to computer programming. Use of event-driven programming language to develop interactive business information systems. 4 lectures/problem-solving.

GBA 530 Legal Environment of Business (4)

Analysis of the essential legal aspects of the business environment dealing with contracts, business-related torts, agency, employment law, and corporations. Function and operation of the courts and administrative agencies. Risk analysis and preventative law approach. 4 lecture discussions.

GBA 531 Production and Operations Management (4)

Introduction to fundamental concepts of production and operations management. Use of quantitative methods, forecasting, resource allocation, decision theory, capacity planning, project management, inventory and quality control. 4 lectures/problem solving. Prerequisite: GBA 514.

GBA 532 Fundamentals of Contracts and Administration (4)

A study of the procedures/applications associated with Federal Acquisition Regulations (FAR). In-depth approach at operational level. Sets pace for employment of FAR, concept formation, contract life and program's successful completion. 4 lectures/problem solving.

GBA 535 Organizational Management, Principles, and Behavior (4)

Integration of management functions and behavioral processes as they relate to the operation of total enterprise. 4 lecture discussions, case studies, experiential exercises.

GBA 546 Fundamentals of Financial Management (4)

Theoretical and conceptual framework for financial decision making stressing analytical and quantitative techniques. Analysis of controversial and sophisticated methods of allocating resources and raising funds both internally and externally within the corporate context. 4 lecture discussions. Prerequisites: GBA 510, GBA 514, and EC 521.

GBA 547 Management Information Systems (4)

Management and development of information systems in modern business and the public sector from the customer and the MIS perspective. Information as a strategic asset. Acquisition, analysis, integration, presentation of internal and external information.

Information management in international and multinational enterprises. Ethical, social impacts. 4 lectures/problem solving.

GBA 552 Analysis of Key Federal Contract Elements: Price/Cost (4)

A study of problems related to federal contracts' categories, either price contract or cost contract. Examines policies/procedures of Federal Acquisition Regulations (FAR) price/cost regulations. Includes DOD/DFAS (variations of FAR) applications, influence and advances price/cost policy/theory. 4 lectures/problem-solving.

GBA 554 Database Design and Processing (4)

Introduction to client/server computing environments. Relational database concepts, data modeling and database design. Distributed database and processing techniques. 4 lectures/problem solving.

GBA 557 Computer-Based Data Communications (4)

Introduction to the use of computers to support data communications. Information systems design issues related to hardware, software, media, networks and protocols. 4 lectures/problem solving. Prerequisite: GBA 522.

GBA 560 Legal Environment of Information Systems (4)

Fundamentals and intermediate knowledge of the legal environment concerning IS. Typical legal problems (private and public sector) arising from the acquisition, use and control of IS. 4 lecture discussions. Prerequisites: CIS 433 and GBA 530, or equivalent experience.

GBA 562 Strategic Human Resources Management (4)

Analytical and descriptive overview of all the main sub-fields within personnel (human resources) management. Typical personnel problems of diverse organizations and their solutions, using contemporary techniques in accordance with legal requirements. 4 lectures/problem solving. Prerequisite: GBA 535.

GBA 563 Executive Development (4)

Analysis of the factors endemic to the successful executive and how these skills and traits can be acquired. 4 seminars.

GBA 564 Creativity and Innovation (4)

Exploring, understanding and developing creativity and innovation in individuals, groups and organizations. Role of creativity and innovation in venturing: opportunity recognition, disruptive technological change, and external environmental dynamics. Innovative organizational structures and cultures.

GBA 565 Professional Presentations Using Technology (3)

Course material demonstrates how proven, effective techniques can blend with new technology of computer-generated graphics to create powerful presentations. 3 lectures/problem solving. Concurrent enrollment in GBA 566 required.

GBA 566 Directed Study in Professional Presentations Using Technology (1)

Independent use of computer application software to design and develop professional presentations, including computer-generated visuals and technology. 1 seminar. Concurrent enrollment in GBA 565 required.

GBA 567 Internet Technologies for Business (4)

Topics include: history of the internet; how the internet works; basic web design, human computer interface design; e-commerce; interactivity on the web; group and individual internet technologies; ethical issues of internet technology. 4 lectures/problem solving.

GBA 570 Creating a Business Plan (4)

Development of a business plan for a new and/or existing business, including managerial philosophies and capabilities. Learning to integrate financials, marketing and operations. Identifying the growth industries in the new millennium. 4 lectures/problem solving.

GBA 571 Venture Growth and Financing (4)

Identifies and analyzes "fast companies" in the 21st century, including $1 to $3 million startups and rapidly emerging firms in the information technology, telecommunications, media, biotechnology, health sciences, and financial -services industries. Explores rapid growth and financial strategies including debt, angel and venture investment, IPOs, harvesting, and being acquired. 4 lectures/problem solving.

GBA 573 Family Business (4)

Business, personal, and interpersonal issues associated with family owned/managed firms are explored; competitive strengths/ weaknesses in family firms; dynamics of family interactions and the business culture; conflict resolution; estate planning; planning for succession. 4 hours lecture-discussion.

GBA 574 Promotional Consultancy (4)

Classroom instruction and field consulting for Competitive Marketing Edge Program. Consultancy clients are real firms in the Cal Poly Pomona market area. Consultancy focus: promotional strategy, advertising, sales promotion, direct sales, public relations, and marketing communications. 4 lecture/discussions.

GBA 577 Advanced IS Auditing (4)

Hands-on experience in applying IS Auditing techniques and methods. Fundamentals of advanced concepts in IS Auditing. 4 lecture discussions and projects. Prerequisites: CIS 433, GBA 522 and GBA 524 or equivalent experience.

GBA 578 Security and Privacy of Information Systems (4)

Practical case-study approach to solving security problems peculiar to the commercial data systems environment. 4 lecture discussions. Prerequisites: CIS 433 and GBA 557, or equivalent experience.

GBA 580 Introduction to Real Estate Analysis and Valuation (4)

Analysis of the economic, financial, institutional, and legal factors affecting the ownership, use, development and valuation of real estate. Qualifies students for the California Real Estate Broker License Examination. 4 lectures/problem solving.

GBA 599/599A/599L Special Topics for Graduate Students (1–4)

Lecture-discussions of selected topics comprising new or experimental courses not otherwise offered. Each offering identified in the current schedule and on the student's transcript. No limitation on repeats.

GBA 607 Global Telecommunications (4)

Telecommunications networks in the global economy. Topics include: the international telecommunications industry; international telecommunications services and applications; international standards; international trade in telecommunications services and products; global telecommunications infrastructure; management and design of

telecommunications networks for global corporations. 4 lectures/problem solving. Prerequisites: GBA 557 and completion of all MBA prerequisite courses.

GBA 608 Managerial Accounting for Decision Making (3)

Use of accounting information for planning and control. Special attention to managerial uses of budgeting and cost data for decision making purposes. 3 lecture discussions. Concurrent enrollment in GBA 609 required. Prerequisites: Completion of all MBA prerequisite courses.

GBA 609 Directed Study in Managerial Accounting (1)

Independent investigation of selected problems in management accounting under the supervision of a faculty member. Individual conferences with the instructor to be arranged. 1 seminar. Concurrent enrollment in GBA 608 required.

GBA 610 Financial Markets and Institutions (3)

The structure and role of the financial system, interest rates, security markets, derivative security markets, government influence on financial markets, commercial banking, and nonbank financial institutions. 3 lectures/problem solving. Concurrent enrollment in GBA 611 required.

GBA 611 Directed Study in Financial Markets and Institutions (1)

Independent investigation of selected topics in financial markets and institutions, under the direction of a faculty member. 1 seminar. Concurrent enrollment in GBA 610 required.

GBA 613 Telecommunications Policy (4)

Examination of global telecommunications policy focusing on the evolution of U.S. telecommunications policy-making and regulation. Analysis of the telecommunications industry from a political, legal, economic, and technological perspective. Policy issues and implementation strategies at the international, national, and organizational levels. 4 lectures/problem solving. Prerequisite: GBA 557.

GBA 614 Network Management and Design (4)

An advanced course in managing and designing telecommunications networks. Topics include: the network life cycle; managing telecommunications projects; quality of service measurement; the five ISO network management functions; network management systems; the network design process; network modeling, simulation, and optimization. 4 lectures/problem solving. Prerequisites: GBA 557 and completion of all MBA prerequisite courses.

GBA 615 Seminar in Organizational Behavior (3)

Human processes employed in accomplishing work tasks and creating employee satisfaction within the organization. Group experiences whereby students test their interpersonal skills in the organizational environment. Group activities; 3 lecture discussions. Concurrent enrollment in GBA 616 required. Prerequisites: Completion of all MBA prerequisite courses.

GBA 616 Directed Study in Organizational Behavior (1)

Independent investigation of selected problems in organizational behavior under the direction of a faculty member. 1 seminar. Concurrent enrollment in GBA 615 required.

GBA 617 Management-Union Relations (4)

The evolving interaction of unions and management within organizations. In-depth look at productivity, quality of working life, and components of our rapidly changing work culture. The future of participative management, legislation, collective-bargaining, and arbitration. 4 lecture discussions. Prerequisites: Completion of all MBA prerequisite courses.

GBA 620 International Business (4)

Survey of social, economic, and political factors governing conduct of business abroad. Analysis of successful and unsuccessful methods of international managers and their staffs. 4 lecture discussions. Prerequisites: Completion of all MBA prerequisite courses.

GBA 628 Management Science Seminar (3)

Quantitative theory and techniques. Linear, integer, non-linear, and dynamic programming, transportation and assignment algorithms, replacement problems, game theory and Markov processes. Introduction to computer solutions. 3 lectures/problem solving. Concurrent enrollment in GBA 629 required. Prerequisites: Completion of all MBA prerequisite courses.

GBA 629 Directed Study in Management Science (1)

Independent investigation of advanced topics in management science under the direction of a faculty member. 1 seminar. Concurrent enrollment in GBA 628 required.

GBA 630 Federal Government Contract Cases, Appeals and Jurisdiction (4)

Study and criticism of federal contracts. Study of important statutes which are framed and directed only at government contracts. 4 lectures/problem solving. Prerequisites: Completion of all MBA prerequisite courses.

GBA 633 Promotion Management (4)

Advertising management as related to entire communication effort of the organization. Emphasis on communication theory, advertising, customer analysis, communicative goals, positioning, personal selling, sales promotion, public relations, publicity, media planning, and budgeting. Cases. Design of promotion plan. 4 lectures/problem solving. Prerequisites: Completion of all MBA prerequisite courses.

GBA 634 Sales Productivity (4)

Analytical and descriptive overview of successful productivity theory models used in contemporary business to business selling and sales management. 4 lecture discussions. Prerequisites: Completion of all MBA prerequisite courses.

GBA 635 Motivation and Market Behavior (4)

Theory and application of the fundamentals of human behavior that affect buying decisions: perception, learning, social and cultural factors. Models of consumer behavior. Selected applications including diffusion of innovation, opinion leadership, marketing communications. Applications to industrial markets and institutional markets. 4 lectures/discussions. Prerequisites: Completion of all MBA prerequisite courses.

GBA 636 Project Management (3)

Planning, scheduling, resource allocation, coordination and control of the activities using bar charts, networks, critical path analysis, resource leveling, and cost-expediting. Computer usage and comparison of microcomputer software for project management. 3 lectures/problem solving. Concurrent enrollment in GBA 637 required. Prerequisites: Completion of all MBA prerequisite courses.

GBA 637 Directed Study in Project Management (1)

Independent use of project management methods for planning, scheduling, resource allocation, coordination and control of the activities of a project under the direction of a faculty member. 1 seminar. Concurrent enrollment in GBA 636 required. Prerequisites: Completion of all MBA prerequisite courses.

GBA 640 Quality Management (3)

Fundamental concepts of Total Quality Management (TQM). Topics include quality management philosophies, planning, teamwork, costs, continuous improvement for production and service systems, audits, standards, awards, inspection and metrology, product and process design, reliability, statistical process control, and acceptance sampling. 3 seminar-discussions. Concurrent enrollment in GBA 641 required. Prerequisites: Completion of all MBA prerequisite courses.

GBA 641 Directed Study in Quality Management (1)

Independent investigations to develop a plan for implementing TQM in business. 1 seminar. Concurrent enrollment in GBA 640 required.

GBA 645 Financial Decision Making (3)

A seminar course in finance, utilizing comprehensive cases to simulate the role of the financial manager. Concurrent enrollment in GBA 646 required. 3 lectures/problem solving. Prerequisites: Completion of all MBA prerequisite courses, GBA 608, and GBA 609.

GBA 646 Directed Study in Financial Decision Making (1)

Independent investigation of selected problems in Advanced Financial Management under the direction of a faculty member. 1 seminar. Concurrent enrollment in GBA 645 required.

GBA 647 Security Analysis and Portfolio Management (3)

The three major types of investment analysis: fundamental, technical and random walk, with emphasis on the fundamental approach to valuation and stock selection. Portfolio analysis, composition, selection, revision and performance. Two-parameter, risk and return models, such as the capital asset pricing model and the capital market line. 3 seminars. Concurrent enrollment in GBA 648 required. Prerequisites: Completion of all MBA prerequisite courses.

GBA 648 Directed Study in Security Analysis and Portfolio Management (1)

Independent investigation of investments under the direction of a faculty member. The student is expected to either comprehensively examine and evaluate a company or manage a hypothetical portfolio. 1 seminar. Concurrent enrollment in GBA 647 required.

GBA 652 Marketing Seminar (3)

Marketing decision making. Application of marketing concepts and implementation of effective marketing programs. Analysis of marketing decision making techniques. Present and future marketing trends. 3 lectures/problem solving. Concurrent enrollment in GBA 653 required. Prerequisite: Completion of all MBA prerequisite courses.

GBA 653 Directed Study in Marketing Seminar (1)

Independent investigation of selected problems in marketing under the direction of a graduate member. 1 seminar. Concurrent enrollment in GBA 652 required.

GBA 654 Business Forecasting (3)

Forecasting techniques. Principles and methods. Evaluation of reliability of existing forecasting techniques. Emphasis on their application and interpretation of results. Numerous computer applications in modeling and forecasting. 3 lectures/problem solving. Concurrent enrollment in GBA 655 required. Prerequisites: Completion of all MBA prerequisite courses.

GBA 655 Directed Study in Business Forecasting (1)

Independent investigation of advanced topics in business forecasting under the direction of a faculty member. 1 seminar. Concurrent enrollment in GBA 654 required.

GBA 656 Financial Modeling (4)

Application of spreadsheet in developing and analyzing financial theories such as valuation models, sales forecasting models, capital budgeting, leasing versus buying, portfolio analysis, and option pricing models. Although students will make extensive use of financial spreadsheet software, no prior experience is necessary. 4 lectures/problem solving. Prerequisites: Completion of all MBA prerequisite courses.

GBA 657 Financial Derivatives (4)

This course covers futures, options, and other derivative instruments. Students will gain an understanding of what the instruments are, how they are priced, and how they can be used to manage financial risk. Some attention will be paid to how these instruments are used for speculation. 4 lectures/problem solving.

GBA 658 Advanced Topics in International Business and Law (4)

Introduction to international law and to the economic institutions that significantly affect the opportunities, methods and transactions of large and small businesses and cross-border investors. 4 lecture/problem solving. Prerequisites: Completion of all MBA prerequisite courses.

GBA 665 Human Interaction Skills Laboratory (4)

Knowledge and skills in interpersonal relations and working groups. Helping skills, understanding group process including unconscious dimensions of leadership, sexism, racism. Sensitivity training and laboratory methods fostering authentic participant involvement. 4 lectures/problem solving. Prerequisites: GBA 615 and GBA 616.

GBA 667 Organizational Development (4)

Initiation and management of organizational efforts at planned improvement. Reviews quality of work life, productivity and quality improvement thrusts, behavioral science perspectives on organizational development. Survey of basic methods; review of domestic and global literature. 4 lectures/problem solving. Prerequisites: GBA 615 and GBA 616.

GBA 671 Management Seminar (3)

The development and evaluation of alternative corporate strategies drawing upon the functional areas within business and the outside environmental factors which affect business. 3 seminars. Concurrent enrollment with GBA 672 required. Prerequisites: Completion of all MBA prerequisite courses.

GBA 672 Directed Study in Management Seminar (1)

Independent investigation of selected problems in management under the direction of a faculty member. 1 seminar. Concurrent enrollment with GBA 671 is required.

GBA 673 Information Systems Seminar (3)

Analyze, discuss challenges and opportunities for effective management

and utilization of contemporary information technologies. Develop frameworks for multifaceted decisions associated with planning, developing, implementing and using computer-based information systems in business organizations. Current and emerging IT issues and best practices. 4 lectures/problem solving. Prerequisites: Completion of all MBA prerequisite courses.

GBA 674 Directed Study in Information Systems Seminar (1)

Independent investigation of selected problems in management under the direction of a faculty member. 1 seminar. Concurrent enrollment with GBA 673 is required.

GBA 680 Real Estate Finance and Investment (4)

Trends in real estate investment opportunities. Current theories and techniques applied to real estate financing, acquisition, real estate mortgage markets, mortgage banking, and brokerage/investment strategies. Partial qualification for the California Real Estate Brokers License Examination. Available for credit for students with FRL 486 only by petition. 4 lectures/problem solving. Prerequisites: Completion of all MBA prerequisite courses.

GBA 683 Business Research Methods (3)

Identification and investigation of business problems. Stating hypotheses, problem statements, defining and collecting data, and selecting appropriate analysis techniques. Examination of types of business research (ex post facto, laboratory, field, delphi or survey) and limitations for inference. 3 lectures/problem solving. Concurrent enrollment in GBA 684 required. Prerequisites: Completion of all MBA core courses.

GBA 684 Directed Study in Business Research Methods (1)

Development of hypotheses, problem statement and bibliography for business problems under the direction of a faculty member. 1 seminar. Concurrent enrollment in GBA 683 is required. Prerequisites: completion of all 600-level core classes.

GBA 685 MSBA Option Project (4)

Synthesis and integration of MSBA Subplan concepts and techniques to a realistic business problem. Application of technical, managerial communications, and interpersonal skills in a group environment. 4 supervision. Prerequisites: GBA 577, GBA 578, GBA 615, GBA 616, and GBA 622, 623. Unconditional standing required.

GBA 687 Strategic Management (3)

A capstone course on decision making at the strategic management level. Cases and assigned readings utilized to focus on the various functional areas of business. Topics include consideration of business ethics and international issues. 3 seminars/discussions. Concurrent enrollment in GBA 688 required. Prerequisites: Completion of MBA core courses.

GBA 688 Directed Study in Strategic Management (1)

Investigation in the overall operation of a business organization based on a computerized simulation program under the supervision of a faculty member. The program requires participants to make strategic decisions which involve the various functional areas of business. 1 seminar. Concurrent enrollment in GBA 687 required.

GBA 691 Directed Study (1–9)

Independent, directed study of advanced topics in business. Class meetings and individual conferences with the instructor to be arranged. Total credit limited to 9 units. Precedes enrollment in GBA 695, GBA 696, or GBA 697. Prerequisite: consent of instructor.

GBA 692 Independent Study (1–4)

Individual investigation or original study to be conducted in a field of interest selected by the student with approval of the instructor. Intensive personal research under initiative of the student with general guidance and advice from the instructor. Study is not to be part of final research project. Total credit limited to 4 units. Prerequisite: consent of instructor.

GBA 695 Business Research Project (2–4)

A written research project concerning a significant problem in the field of business. Directed by a committee of graduate faculty members. Total credit limited to 4 units. Prerequisites: GBA 683 and GBA 684 for MBA candidates and approved committee form on file in Business Graduate Office; GBA 691 required for MSBA candidates. Advancement to Candidacy required.

GBA 696 Master's Degree Thesis (2–4)

A formal thesis concerning a significant problem in the field of business. Directed by a committee of graduate faculty members. Total credit limited to 4 units. Prerequisites: GBA 683 and GBA 684 for MBA candidates and approved committee form on file in Business Graduate Office. Advancement to Candidacy required.

GBA 697 Comprehensive Examination (1)

An examination on the subject areas of the candidate's coursework listed on the degree program. May be taken no more than two times. Failure to complete exam satisfactorily the second time will result in termination from the program. Candidates must register through the MSBA in IS Auditing advisor. Advancement to Candidacy required.

GBA 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Advancement to candidacy required. This course is graded on a mandatory credit/no credit basis.

ACCOUNTANCY

MASTER OF SCIENCE IN ACCOUNTANCY

In the Department of Accounting, College of Business Administration

http://www.cba.csupomona.edu/acc

Anwar Y. Salimi, Chair and MSA Program Director

The College of Business Administration offers a Master of Science in Accountancy for individuals wishing to pursue a career in Accounting. The objectives of the program are: advance professional knowledge in accounting and its role in organization and society, prepare students for professional opportunities in accounting, allow students to obtain professional accounting experience and "Learn By Doing" through internships, prepare students to respond to and effectively manage current conditions in the economy and the accounting profession, provide working accounting professionals an opportunity to acquire and upgrade professional accounting skills, prepare students for doctoral studies in accounting and allow students to meet the educational requirements to attain accounting professional certifications.

ADMISSION TO THE PROGRAM

1. Admission to the MSA program will be granted upon the recommendation of the College of Business Administration Associate Dean, along with the recommendation of the MSA Program Director of the department. Selection will be on the basis of evidence of ability to perform at a high academic level. An applicant shall have a bachelor's degree in business (with an emphasis in accounting) or accounting from an accredited college or university. The following criteria are considered: undergraduate grade-point average (a minimum GPA of 3.0 in upper-division undergraduate work is recommended), scores on the Graduate Management Admissions Test (GMAT), managerial work experience, letters of recommendation, and applicant's personal statement. . . . . .
2. A GMAT score of 550 or higher is required for admission to the program.
3. A TOEFL score of 580 or better (or the equivalent for a computer- or web-based test) is required for admission of international students to the program.
4. A program worksheet of the degree requirements will be prepared by the Graduate Business Programs Office when the student is admitted. During the second quarter of attendance and prior to the student's advancement to candidacy, an official degree program will be prepared. It will be approved by the Associate Dean and verified by the Graduate Studies Analyst.

Conditional admission may be granted to applicants who do not satisfy all the criteria for admission. When an applicant is admitted conditionally, the conditions to be met and the time allowed for meeting them are stated in the letter of admission. If these conditions are not satisfied, the student may be disqualified from the program.

CONDITIONAL ADMISSION

Admission to the Program may be offered to qualified applicants without a bachelor's degree in Accounting. Such applicants must complete the prerequisites listed in the program worksheet before starting the MSA Program. Admitted students without the bachelor degree of Accounting should satisfactorily complete the prerequisite courses listed below.

Business Majors in Non-Accounting Specializations

The term "Business Majors in Non-Accounting Specializations" refers to those applicants holding a bachelor's degree in business administration with a specialization in fields other than accounting. These applicants should complete the following seven accounting courses with a satisfactory grade ("B" or 3.0 GPA): (1) Introduction to Accounting Information System (ACC 304), (2) Cost Accounting (ACC 307), (3) Intermediate Accounting I (ACC 311), (4) Intermediate Accounting II (ACC 312), (5) Intermediate Accounting III (ACC 313), (6) Auditing (ACC 419), and (7) Introduction to Tax (ACC 431). Such prerequisites will be waived if similar courses have been completed with a "B" or better grade from any AACSB accredited business school. The prerequisites may be considered to be waived if those courses have been completed with a "B" or better grade from a non-AACSB accredited business school.

Non-Business Majors

The term "Non-Business Majors" refers to applicants holding a bachelor's degree with a major in a field other than business. These applicants should complete the following twelve prerequisite courses with a satisfactory grade ("B" or 3.0 GPA): (1) Legal Environment (FRL 201 or GBA 530), (2) Financial Accounting (ACC 207 and ACC 207A, or GBA 510), (3) Cost Accounting (ACC 307), (4) Managerial Finance (FRL 300 or GBA 546), (5) Managerial Statistics (TOM 302 or GBA 514), (6) Principles of Economics (EC 201 or EC 521), (7) Introduction to Accounting Information System (ACC 304), (8) Intermediate Accounting I (ACC 311), (9) Intermediate Accounting II (ACC 312), (10) Intermediate Accounting III (ACC 313), (11) Auditing (ACC 419), and (12) Introduction to Tax (ACC 431). Such prerequisites will be waived if such courses have been completed with a "B" or better grade from an AACSB-accredited business school. The prerequisites may be considered to be waived if those courses have been completed with a "B" or better grade from a non-AACSB accredited business school.

All students will also have a target date of completion for the prerequisite courses specified in their Program of Study before taking classes. Failure to complete the prerequisites agreed to within the specified time may cause the student to be put on probation.

Requirements

The curriculum for the Master of Science in Accountancy requires a minimum of 45 units of course work. The program of study consists of twenty-eight (28) units of required courses, sixteen (16) units of elective courses and a comprehensive examination (1 unit). The elective courses must be chosen from an approved list of accounting and business courses. The elective courses should be chosen in collaboration with an advisor to insure consistency with graduate goals and to assure an integrated educational experience. No more than 13 units of acceptable graduate credit may be transferred from another AACSB accredited graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above. 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. Candidates must fulfill the terminal requirement of a comprehensive examination and be enrolled in the university during the quarter of graduation.

General requirements for all advanced degrees (including MSA) are found in the Graduate Scholastic Requirements section of the University catalog. Although the typical student pursuing an MSA

degree is expected to have a baccalaureate degree in Accounting, the program is designed to accommodate qualified applicants holding degrees in related business areas. Those applicants may be admitted conditionally and required to take prerequisites with no graduate credit as stipulated above. Admission to the program however does not admit a student to candidacy for the degree. Advancement to candidacy is granted upon recommendation of the faculty and implies readiness to attempt a comprehensive examination. Students who are not candidates are not eligible to register for ACC 697, Comprehensive Examination. In order to advance to candidacy for the Master of Science in Accountancy a student must:

a) achieve unconditional standing;

b) complete at least 28 quarter units of required graduate course work with a grade point average of 3.00 or better;

c) satisfy the Graduation Writing Test;

d) have an approved program of study on file.

In addition, each student is responsible for satisfying all university requirements specified elsewhere in the university catalog.

Curriculum

Required Courses

Required courses include the following for a total of twenty-nine (29) units:

Business Valuation Using Financial Statements	ACC	600	(4)
Management Accounting Seminar	ACC	608	(4)
Internal Control and Corporate Governance	ACC	610	(4)
Assurance and Regulation in Accounting	ACC	620	(4)
International Accounting Issues	ACC	630	(4)
Internship in Accounting	ACC	650	(4)
		(increase electives if waived)	
Contemporary Accounting Issues	ACC	660	(4)
Comprehensive Examination	ACC	697	(1)

Elective Courses

Select two or more courses from List A and up to two courses from List B for a total of sixteen (16) units:

List A

Management Control in Not-For-Profit Organizations	ACC	670	(4)
Fraud and Forensic Accounting	ACC	680	(4)
Strategic Tax Planning	ACC	690	(4)

List B

Organizational Communications	GBA	527	(4)
Client Server Computing	GBA	554	(4)
Legal Environment of Information Systems	GBA	560	(4)
Total Quality Management	GBA	640	(3)
Directed Study in Total Quality Mangement	GBA	641	(1)
Financial Decision-Making	GBA	645	(3)
Directed Study in Financial Decision-Making	GBA	646	(1)
Security Analysis and Portfolio Management	GBA	647	(3)
Directed Study in Security Analysis and Portfolio Management	GBA	648	(1)
Business Forecasting	GBA	654	(3)
Directed Study in Business Forecasting	GBA	655	(1)
Information Systems Seminar	GBA	673	(3)
Directed Study in Information Systems	GBA	674	(1)
Business Research Methods	GBA	683	(3)
Directed Study in Business Research Methods	GBA	684	(1)
Management Policies and Strategies Practicum	GBA	687	(3)
Directed Study in Management Policies and Strategies	GBA	688	(1)
Business Research Project	GBA	695	(2-4)

Other GBA courses if approved by the Program Director.

ACCOUNTING GRADUATE COURSE DESCRIPTIONS

ACC 600 Business Valuation Using Financial Statements (4)

Provides a framework for business analysis and valuation using financial statement data and gives practical advice when using the framework to value a firm. Emphasizes integration of key concepts from accounting finance, economic and business strategy and illustrates the latest techniques and information sources used by financial information industry professionals. 4 Seminar, Case Analysis

ACC 608 Management Accounting Seminar (4)

Strategic management accounting and control issues, including cost determination and analysis, activity-based systems, budgeting, transfer pricing, performance evaluation, cost management and ethics. 4 lecture / discussion. Prerequisite: GBA 511 or equivalent.

ACC 610 Internal Control and Corporate Governance (4)

Presents the foundation of internal control theory accepted and promulgated by auditors and accountants. Supplemented by management implementation to achieve effective corporate governance. Includes best practices from preeminent companies that serve as benchmarks and models for evaluating and strengthening corporate governance. Seminar course with problem solving and case studies.

ACC 620 – Assurance and Regulation in Accounting (4)

A managerial perspective on accounting assurance and regulatory requirements for all types of businesses. Emphasis on financial statement audits, public company requirements, other governmental regulation and internal auditing. Seminar course with problem solving and case studies.

ACC 630 International Accounting Issues (4)

Exploration of international accounting issues from interdisciplinary, managerial perspectives. Comparative accounting across national borders. Harmonization and evaluation of international accounting standards. Foreign exchange. Mergers, acquisitions and business valuation. Ethics. Management control issues in international contexts. 4 lecture/problem-solving. Prerequisite: unconditional standing

ACC 650 – Internship in Accounting (4)

On-the-job training in accounting involving new masters-level learning experiences. Prerequisite: permission of the Director of the Accounting Graduate Program.

ACC 660 Contemporary Accounting Issues (4)

Study and analysis of contemporary accounting issues and practices. Emphasis on the integration of accounting knowledge in financial and managerial accounting, tax, accounting information systems, and auditing. Enhances analytical research, judgmental and communication skills of students. 4 seminars, case analysis

ACC 670 Management Control in Not-for-Profit Organizations (4)

Application of the processes of budgeting, planning, and controlling in governmental, hospital, and educational institutions as well as charitable foundations. Case studies and a service component with an appropriate entity. Prerequisites: Unconditional Standing.

ACC 680 – Fraud and Forensic Accounting (4)

A managerial perspective on fraud within an organization. Emphasis on fraud prevention and detection methods. Survey of the management support resources available in the field of forensic accounting. Case study and analysis of financial statement frauds.

ACC 690 Strategic Tax Planning (4)

A hands-on course for Masters of Accountancy students on how to factor taxes into strategic decision-making. 4 seminar-discussions.

ACC 697 Comprehensive Examination (1)

Terminal requirement for MS in Accounting program. Completion of comprehensive exam applying material from core courses. Prerequisites: completion of MSA core.

COLLEGE OF EDUCATION AND INTEGRATIVE STUDIES

MASTER OF ARTS IN EDUCATION

In the Department of Education
www.csupomona.edu/~ceis/TEDIndex.html

Dorothy MacNevin, Chair and Graduate Coordinator

Stephen Davis
Christine Dehler
Aubrey Fine
Amy Gimino
Phyllis Hensley
Thien Hoang
Dennis Jacobsen
Shahnaz Lotfipour
Richard Navarro
Doreen Nelson
Jann Pataray-Ching
Nancy Prince-Cohen
Teshia Roby

Graduate Degree Program Advisors

Curriculum and Instruction
Jann Pataray-Ching
Nancy Prince-Cohen

Curriculum and Instruction: Design-Based Learning
Doreen Nelson

Curriculum and Instruction: Heritage Languages, Literacy and Leadership
Richard Navarro

Educational Multimedia
Shahnaz Lotfipour

Educational Leadership
Dennis Jacobsen

Special Education
Thien Hoang

MISSION STATEMENT

The mission of the Master of Arts in Education program is the (1)development of highly competent teacher leaders in an area of specialization; (2)preparation of leaders to serve the schools in the region to improve student learning, and (3)preparation of educators for teaching, research and consulting in business and industry; and (4)development of lifelong professional educators with potential for self-directed study and research.

ADMISSION TO THE PROGRAM

An applicant for this program must have a valid teaching credential or have been admitted to a credential program at this university and hold a bachelor's degree from an accredited institution. A teaching credential is not required for students applying to the Educational Multimedia Subplan or its certificate programs. Students entering the master's program may be admitted with a conditional status with the consent of the Graduate Coordinator.

Graduates of foreign universities are exempt from credential requirements but must show equivalency. International students are required to take the TOEFL examination.

Applicants who do not meet the minimum grade point average of 3.0 overall in their undergraduate work or 3.0 for graduate work, but who show compensating strengths, may be admitted conditionally through an exceptional admission process. Candidates with conditional status are provided a written statement of entrance conditions, including the time within which the conditions are to be met. If the conditions are not satisfied within the specified time, the candidate will be denied further enrollment in the program.

A candidate who is pursuing a baccalaureate degree from this university and who plans to continue in graduate study will need to apply for admission to the Master of Arts in Education program during the final quarter of the senior year to be considered for programs that do not require a teaching credential as a prerequisite for admission. Applications should be submitted to the Office of Admissions. Students in the credential program, who have already been admitted to the University as a post-baccalaureate student, may file a petition to Change/Add Graduate Degree Objective to request acceptance into a master's degree program in lieu of reapplying to the University. Candidates seeking admission to a graduate degree program by petition are subject to all the same requirements as applicants applying directly for graduate admission.

M.A. candidates must complete a preliminary contract for a formal degree program in consultation with the Graduate Coordinator or Graduate Degree Program Advisor within the first three months of admission.

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 to 600 level (graduate). All 400-level course credit will be specified by the Department of Education. Methods courses and student teaching shall not be applied to the master's degree. Thirty-two (32) units of coursework must be taken in residency.
2. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.
3. A grade-point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and graduate courses to satisfy the requirements for the Master of Arts in Education.
4. Completion of all requirements for a teaching credential, or equivalent is required prior to the granting of the degree of Master of Arts in Education. Certain exceptions can be made at the discretion of the department.
5. Advancement to Candidacy must be applied for and granted.
6. The Graduation Writing Test (GWT) requirement must have been satisfied by the second quarter after admission. A thesis or project must be satisfactorily completed as a culminating requirement. The comprehensive examination, an alternative culminating requirement, is available only to students in the Special Education program.
7. The candidate must be continuously enrolled in the university during the quarter of graduation.

CURRICULUM

The master's degree curriculum in education is a flexible one requiring a minimum of 45 units, organized as follows: 6 units in research and project/thesis, 8 units of research methodology, 18-20 units in a specific area, and 10-12 units of electives. Credit for a maximum 13 quarter units of Extended University or approved transfer courses, or up to 18 quarter units of approved credit in a single specified area not offered by the College of Education and Integrative Studies, but taken at this university, may become a part of the Master of Arts in Education contract. All contracts must be approved by the graduate degree program advisor, the graduate coordinator, the department chair, the dean, and the university graduate studies analyst.

The approved program constitutes the candidate's curriculum for the master's degree. Any changes in the program require an academic petition filed by the candidate and approved by the graduate degree program advisor, the graduate coordinator, the department chair, the dean, and the university graduate studies analyst.

The curriculum consists of four elements. The first element consists of coursework from the graduate offerings in education, selected by the student and advisor/coordinator to meet the candidate's academic needs, based upon previous preparation and the requirements of employment. Courses available for this purpose cover such areas as language and literacy, educational multimedia, design based learning, heritage languages, special education, and educational leadership.

The second part of the curriculum is composed of approved upper-division and graduate electives from offerings in education or in other appropriate disciplines to complement the rest of the student's curriculum.

There are program emphases within the Curriculum and Instruction, Educational Multimedia, Special Education, and Educational Leadership subplans. The Curriculum and Instruction subplan prepares teachers for leadership in education, including classroom teaching, staff development, alternative education and program development. This subplan offers emphases in: Heritage Languages and Design Based Learning.

The Educational Multimedia subplan reflects the convergence of two powerful technologies, computers and media. It also reflects the increasing importance of the new tools of technology in today's world. The mission of the Educational Multimedia subplan encompasses the following purposes:

1. Development of highly competent computer and media teachers;
2. Development of educational multimedia software designers and producers;
3. Development of educational multimedia training consultants;
4. Development of instructional designers, media producers, technology project managers and evaluators; and,
5. Development of life-long learners and explorers in the fascinating arena of educational technology.

The Special Education subplan offers emphases in Mild/Moderate and Moderate/Severe. The subplan is designed to give candidates a theoretical and practical background in the educational, social, and environmental aspects of students with disabilities.

The third part of the curriculum consists of a selection of research courses recommended for all programs for the Master of Arts degree in Education. These courses include:

Educational Assessment	GED	532	(4)
*Seminar in Educational Research	GED	690	(4)
Directed Study	GED	691	(3)
*Conducting Educational Research	GED	693	(4)

* Preparation for GED 695/695

The fourth part of the curriculum consists of successful completion of one of the following required culminating experiences:

Master's Degree Project	GED	695	(6)
or Master's Degree Thesis	GED	696	(6)
or Comprehensive Examination (available for Special Education Subplan only)	GED	697	(1)

I. SUBPLAN—CURRICULUM AND INSTRUCTION

The requirements may include the following:

Core Courses (18–22 Quarter Units)

Curriculum and Instruction	GED	542/542A	(3/1)
Child and Adolescent Development	GED	506	(3)
Education of the Minority	GED	504	(3)
The Professional Teacher	GED	595/595A	(3/1)
Learning and Instruction	GED	592/592A	(3/1)

Elective Courses: (3–12)

By approval of an advisor, students may take courses in technology, policies and issues, or in content areas by advisement, such as GED 519, GED 520, GED 522/522A, GED 525, GED 546, GED 550, GED 596, GED 599, and GED 650.

Total Units . . . . . (22-34)

Students seeking the M.A. in Education degree will complete the core and recommended elective courses in this program emphasis and an approved research component. The research component must include successful completion of a final cultimating experience (6 units of project or thesis) for all programs except Special Education, which allows either thesis, project, or a one-unit comprehensive examination. The total minimum requirement is 45 quarter units. Students seeking this degree option are required to meet admission requirements for advancement to candidacy.

CURRICULUM AND INSTRUCTION: DESIGN-BASED LEARNING

The requirements for the Design-based Learning strand are the following:

Introduction to Design Based Learning	GED	540	(4)
Design Based Learning As a Process	GED	541	(4)
Making Curriculum Physical	GED	547	(4)
The Classroom as a Micro World	GED	548	(4)
Developing Curriculum Presentations with Technology	GED	549	(4)
Total Units			(20)

HERITAGE LANGUAGES: LITERACY AND LEADERSHIP

The requirements for the Heritage Languages: Literacy and Leadership program may include the following:

Introduction to Contemporary Schooling	TED	405	(4)
or Diagnosis, Assessment and Evaluation of Literacy	GED	520	(4)
Education in a Diverse Society	TED	407	(4)
or The Psychology of Literacy	GED	525	(4)
Sociolinguistic and Multicultural Aspects of Language and Literacy Acquisition	GED	528	(4)
Applied Linguistics in Literacy Acquisition	GED	534/534A	(3/1)

Leadership and Public Policy in Language and Literacy: Public Policy and Facilitation	GED	567/567L	(2/2)
or Language, Literacy and Human Development	GED	596	(4)
Total Units			(24)

II. SUBPLAN—EDUCATIONAL MULTIMEDIA

The requirements for the Educational Multimedia include the following:

Prerequisite Courses (0–4 units)

Foundations of Educational Computer Literacy	GED	500/500L	(3/1)

Or equivalent courses, or permission of instructor.

Required Courses (24 units):

Educational Telecommunications	GED	512/512L	(3/1)
Web-based Programming in Education	GED	513/513L	(3/1)
Graphic Design for Educational Multimedia	GED	571/571L	(3/1)
Instructional Design for Educational Multimedia	GED	572/572L	(3/1)
Advanced Educational Multimedia Production	GED	577/577L	(3/1)
Alternative Learning Environments	GED	578/578L	(3/1)

Elective Courses (4–8 units):

With the approval of the advisor, a minimum of 3 units is to be selected from the following list:

Integrating Technology into Teaching and Learning	GED	507/507L	(3/1)
Video Production and Digital Video Editing	GED	575/575L	(3/1)
Advanced Educational Computer Programming (Lingo or DHTML)	GED	580/580L	(3/1)
Directed Study	GED	692	(1-3)

(Internship in approved activity may be taken for one unit per quarter)

III. SUBPLAN—SPECIAL EDUCATION

The requirements for the Special Education subplan may include approved courses from Levels I and II Mild/Moderate and Moderate/Severe credential courses as follows:

Level I

Special Populations	TED	551	(4)
Assessment of Students with Mild/Moderate Disabilities	TED	553	(4)
Assessment for Special Education	TED	555	(4)
Curriculum for Students with Moderate/ Severe Disabilities	TED	556	(4)
Introduction to Mild/Moderate Disabilities	TED	582	(4)

Level II

Advanced Study of Moderate/Severe Disabilities	TED	530	(4)
Advanced Behavioral and Environmental Supports	TED	589	(4)
Leadership in Special Education	TED	591	(4)
Advanced Reading Seminar	TED	554	(4)
Advanced Seminar in Mild/Moderate Disabilities	TED	559	(4)
Organization and Management of Special Ed	TED	584	(4)
Introduction to Assistive Technology	TED	588	(4)

IV SUBPLAN–EDUCATIONAL LEADERSHIP: Preliminary Administrative Services Credential Tier I

Core Requirements

Introduction to Educational Administration	EDU	505/A	(3/1)
Educational Leadership	EDU	506/A	(3/1)
Educational Administration: Organizational Behavior	EDU	510/A	(3/1)
School Personnel Administration	EDU	511/A	(3/1)
School Law and Governance	EDU	512/A	(3/1)
School Finance	EDU	513/A	(3/1)
Administration and Instructional Technology	EDU	514/A	(3/1)
Candidate Performance Assessment Seminar	EDU	520	(1)

Fieldwork

Fieldwork in Educational Administration. (Two quarters of EDU 530 fieldwork are required.)	EDU	530	(4)(4)

Elective Course Requirements or Non-University Credits

Seminar in Educational Issues	GED	550	(4)

NOTE: Students participating in the Intern Program must register for GED 692 Directed Study (1) each quarter.

V SUBPLAN–EDUCATIONAL LEADERSHIP: Preliminary Administrative Services Credential Tier II

Core Requirements

Professional Credential Induction Plan: Assessing for Improved Leadership	EDU	532	(4)
Leadership, Policy and Schools in a Democratic Society	EDU	534/534A	(3/1)
Legal Aspects and Organizational Change for Safe Performing Schools	EDU	535/535A	(3/1)
The Principal As Instructional Leader	EDU	536/536A	(3/1)
Utilizing Fiscal and Human Resources for Safe and Effective Schools	EDU	537/537A	(3/1)
Ethics, Morals, and Values for Educational Leadership	EDU	538/538A	(3/1)
Technology and Information Systems for the Enhancement of Instruction and Management	EDU	539/539L	(3/1)
Assessment of Professional Competency	EDU	540	(2)
Practicum I Literacy and Instructional Excellence	EDU	543	(4)
Practicum II Leadership in Challenging and Economic Times	EDU	544	(2)
Practicum III Legal Aspects for Safe and Effective Schools	EDU	545	(2)

NOTE: The core curriculum courses may be applicable to the Master in Education, Educational Leadership emphasis.

CREDENTIAL PROGRAMS

The university offers a number of programs leading to certification for elementary and secondary school teaching as well as various specialists' credentials under the auspices of the College of Education and Integrative Studies. These are described in other sections of this catalog.

Methodology courses, field experiences and clinical practice courses are not applicable to the Master of Arts Degree in Education. Some foundation courses may apply if taken for graduate credit within the time frame of the MA contract.

GRADUATE CERTIFICATE PROGRAMS IN EDUCATIONAL MULTIMEDIA

Admission requirements for the special certificates of competencies for the Educational Multimedia, Computers in Education, and Computer Troubleshooting programs are the same as the requirements for admission to the Master of Arts in Education degree program.

The following courses are required to complete these certificate programs, respectively:

Computers in Education Certificate (20 Units)

Prerequisite Courses
(or equivalent courses, or permission of instructor)

Foundations of Educational Computer Literacy . . . .GED 500/500L (3/1)
Introduction to Multimedia Applications
and Production . . . . . .GED 508/508L (3/1)

Required for all Students
Educational Telecommunications . . . . . .GED 512/512L (3/1)
Web-based Programming in Education . . . . . .GED 513/513L (3/1)
Graphic Design for Educational Multimedia . . . . . .GED 571/571L (3/1)
Instructional Design for Educational Multimedia . .GED 572/572L (3/1)
Advanced Educational Computer
Programming-DHTML Programming . . . . . .GED 580/580L (3/1)

Educational Multimedia Certificate (20 Units)

Prerequisite Courses (0–7 units)
(or equivalent courses, or permission of instructor.)

Foundations of Educational Computer Literacy . . . .GED 500/500L (3/1)
Introduction to Multimedia Applications
and Production . . . . . .GED 508/508L (3/1)

Required for all Students
Graphic Design for Educational Multimedia . . . . . .GED 571/571L (3/1)
Instructional Design for Educational Multimedia . .GED 572/572L (3/1)
Video Production and Digital Video Editing . . . . . .GED 575/575L (3/1)
Advanced Educational Multimedia Production . . . .GED 577/577L (3/1)
Advanced Educational Computer Programming
Lingo Programming . . . . . .GED 580/580L (3/1)

Computer Troubleshooting Certificate for Educators

Prequisite Courses (0–3)*
Foundations of Educational Computer Literacy . .GED 500/500L (3/1)
*or equivalent courses or permission of Program Coordinator.

Required Courses
Operating Systems and Troubleshooting . . . . . .GED 514/514L (3/1)
Troubleshooting Hardware-Macintosh Platform . . .GED 5151515L (3/1)
Troubleshooting Hardware-PC Platform . . . . . .GED 517/517L (3/1)
Operating Systems and Troubleshooting . . . . . .GED 521/521L (3/1)
Peripherals, Networks, and Troubleshooting . . . . .GED 524/524L (3/1)

GRADUATE COURSE DESCRIPTIONS

GED 400/400L Foundations of Educational Computer Literacy (3/1)

An introduction of hardware/software, OS, maintenance, troubleshooting, selection/evaluation of software; production of instructional materials using graphics, wordprocessing, database, spreadsheet, authoring programs. Access/control issues of new technologies in society/classrooms; using email, threaded discussion, newsgroups, listservs, chat rooms, and planning for Web publishing. 3 lecture discussions; 1 three-hour laboratory.

GED 407/407L Integrating Technology into Teaching and Learning (3,1)

An investigation into the uses of computers and computer-based technology in the classroom, integration of technology into the teaching and learning process, using the principles of instructional design in the design of technology-rich learning environments, designing and developing technology-based instructional and learning materials for educational and training settings. 3 lecture discussions; 1 three-hour laboratory.

GED 500/500L Foundations of Educational Computer Literacy (3/1)

An introduction of hardware/software, OS, maintenance, troubleshooting, selection/evaluation of software; production of instructional materials using graphics, wordprocessing, database, spreadsheet, authoring programs. Access/control issues of new technologies in society/classrooms; using email, threaded discussion, newsgroups, listservs, chat rooms, and planning for Web publishing. 3 lecture discussions; 1 three-hour laboratory.

GED 504 Education of the Minority (3)

Foundation study of the ethnic minority cultures as they relate to the teaching-learning process. Research, principles, and practices. Refer to College of Education class schedule for specific group emphasis each quarter. May be repeated for a total of 9 units. 3 lecture discussions.

GED 506 Child and Adolescent Development (3)

Overview of the child and adolescent development process, 0-21 years of age and its relationship to the learning process. 3 lecture discussions.

GED 507/507L Integrating Technology into Teaching and Learning (3/1)

An investigation into the uses of computers and computer-based technology in the classroom, integration of technology into the teaching and learning process, using the principles of instructional design in the design of technology-rich learning environments, designing and developing technology-based instructional and learning materials for educational and training settings. 3 lecture discussions; 1 three-hour laboratory.

GED 508/508L Introduction to Multimedia applications and Production (3/1)

Exploring the role of interactive media in learning environments; multimedia applications in education/training; copyright law, fair use guidelines; introduction to digital presentation and hypermedia, use of authoring systems, including stacks, page, buttons, fields, messages, handlers, drawing/text tools, icon editing, animation and sound. 3 seminar/discussions; 1 three-hour laboratory.

GED 509 Education of Contemporary Youth (3)

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 the teacher and school in helping young people achieve identity. 3 seminars.

GED 512/512L Educational Telecommunications (3/1)

Course examines how the Internet, its tools and resources be integrated in educational settings for delivering course content, providing access to resources, expanding the classroom, and supporting learning styles. Learn how to plan, design, develop and evaluate Internet-based learning activities/course websites. 3 seminar-discussions; 1 three-hour laboratory.

GED 513/513L Web-Based Programming in Education (3/1)

Introduction to computer programming and the use of high-level authoring systems; programming techniques, top-down design, modularization, messages, message order, variables, values, operators, precedence, writing efficient code, and stylistic issues. 3 seminar/discussions; 1 three-hour laboratory. Prerequisite: GED 512/512L, or permission of instructor.

GED 514/514L Operating Systems and Troubleshooting (3/1)

An introduction to fundamental steps in diagnosing problems, working between the two platforms, hardware terminology, Operating Systems, and techniques involved in the troubleshooting process. Prerequisites: GED 500/500L. 3 lecture discussions; 1 three-hour laboratory.

GED 515/515L Troubleshooting Hardware-Macintosh Platform (3/1)

The course covers the installation and removal of Macintosh Hardware components, configuration of related software applications, system maintenance and upgrading, and diagnosing related hardware problems in the Macintosh environment. Prerequisite: GED 514/514L. 3 seminar-discussions; 1 three-hour laboratory.

GED 517/517L Troubleshooting Hardware-PC Platform (3/1)

The course covers the installation and removal of PC Hardware components, configuration of related software applications, system maintenance and upgrading, and diagnosing related hardware problems in the PC environment. Prerequisites: GED 514/514L. 3 seminar-discussions; 1 three-hour laboratory.

GED 518/518A Teaching Writing: Process and Product (K-8) (3/1)

An in-depth exploration of writing. An investigation of the writing process and an exploration of strategies for teaching writing across the curriculum for diverse populations. 3 seminars, 1 two-hour activity.

GED 519/519A Language and Literacy Research: Design and Application (3/1)

Survey of language and literacy research from a variety of methodological perspectives. Application of findings for the improvement of instruction and literacy. 3 seminars, 1 two-hour activity.

GED 520 Diagnosis, Assessment and Evaluation of Literacy (4)

Introduction to formal and informal, individual and group assessment materials related to language and literacy acquisition in first and second languages; understanding validity; reliability and cultural bias of literacy assessment instruments. 4 seminars.

GED 521/521L Operating Systems and Troubleshooting (3/1)

An investigation into the basic functionality of the OS and Windows systems. Students will also explore troubleshooting and emergency procedures which include problem-solving, upgrades, and maintenance of the operating systems. Prerequisites: GED 500/500L, and GED 514/514L. 3 seminar-discussions; 1 three-hour laboratory.

GED 522/522A Instructional Strategies for Language and Literacy Field Sites (2,2)

Application of theoretical knowledge and formal and informal assessment leading to the development and implementation of instructional strategies to specific individual and group language/literacy needs in the context of our complex contemporary society. Must include 15 student contact hours. 2 seminars, 2 two-hour activity.

GED 523 Language Acquisition and Emergent Literacy for the Young Child (4)

The development of literacy in the young child. Classroom and clinical experience in assessment of development in literacy. Criteria for selection of curriculum materials and procedures in the development of emergent literacy. 4 seminars.

GED 524/524L Peripherals, Networks, and Troubleshooting (3/1)

This course covers diagnosing and solving problems that networks and peripheral devices present in the Mac and PC environment. Students will learn how to troubleshoot and identify the issue(s) that cause network downtime and performance degradation. Prerequisites: GED 500/500L, GED 514/514L, and GED 521/521L. 3 seminar-discussions; 1 three-hour laboratory.

GED 525 The Psychology of Literacy (4)

Examination of reading as a process of constructing meaning through the dynamic interaction of the reader's existing knowledge, the information suggested by the written language, and the context of the reading situation. 4 seminars.

GED 527/527A Literacy and Technology (3/1)

Inquiry into the uses of computer and allied information technologies in literacy instruction; critiques of instructional software; evaluation of programs in light of contemporary literacy and theory practice; opportunity to design new software. 3 seminars, 1 two-hour activity.

GED 528 Sociolinguistic and Multicultural Aspects of Language and Literacy Acquisition (4)

Application of theories and models of second language acquisition: historical, cultural, social, political, and economic factors influencing literacy for the second language learner. Further exploration of the influence of specific cultural context and convention on the learning environment. 4 seminars.

GED 532 Educational Assessment (4)

Basic principles of educational measurement and evaluation; teacher constructed instruments and techniques; selection and interpretation of standardized and criterion referenced measurements. 4 seminars.

GED 534/534A Applied Linguistics in Literacy Acquisition (3/1)

Exploration of the relationship between literacy and linguistics as affected by pragmatics, syntax, phonology and semantics. 3 seminars, 1 two-hour activity.

GED 535 The Gifted Individual: Curriculum and Instruction (3)

Current practice, research, issues and trends of teaching models and curriculum development for the gifted and talented. 3 seminars.

GED 536 Seminar in Giftedness and Creativity (3)

Problems of affective, cognitive, and social development of gifted and talented individuals. Examination of higher cognitive functioning and characteristics of performance of creativity. 3 seminars.

GED 537 Curriculum Evaluation (3)

Theory and practice of instructional program evaluation. Educational evaluation models, alternatives, and guidelines for curriculum evaluation. 3 seminars.

GED 540 Introduction to Design-Based Learning (4)

Presents hands-on techniques for teaching required standards in grades K-12 to improve student performance and evaluation. Studies effective methods for promoting intellectual and social development. Provides practical examples and guidebooks of how to integrate subjects from various California State Curriculum Frameworks based on a method known as City Building Education. This is a course for students of graduate standing in education only. No technical design skills are needed. 4 seminars.

GED 541 Design-Based Learning as a Process (4)

Examines current research of methodologies that use hands-on learning to promote higher level thinking. Topics include non-specific transfer of learning and the use of techniques from the design professions to deliver California State Curriculum Standards. Develops long range curriculum plans specific to the students' classrooms.

GED 542/542A Curriculum and Instruction (3/1)

Integrating curriculum and instruction in multicultural schools. Examination of curriculum emphasizing the needs of the student, the environment and teacher. Creation and validation of curriculum programs. 3 lecture-discussions; 1 two-hour activity.

GED 543 Implementation of Early Childhood, Elementary and Secondary Education Programs (3)

Instructional strategies to achieve curriculum goals in language arts, science, motor activities, music, art, and other major curriculum areas. Refer to College of Education class schedule for specific group emphasis each quarter. May be repeated for a total of 9 units. 3 seminars.

GED 544 Advanced Child and Adolescent Development (3)

Experimental and theoretical literature relating to the development of child and adolescent; implications for the student's continuing educational experiences. 3 seminars.

GED 546 School, Community, and Home Relations (3)

Cooperative school, home, and community relations. Professional and community resources for family, health, welfare, and improving child and adolescent development. Implications for school curriculum. 3 seminars.

GED 547 Making Curriculum Physical (4)

Studies processes, tools, and techniques used to visualize, display, and organize information. Provides practice with a variety of mechanisms and methods for envisioning basic curriculum and linking it to any subject matter. 4 seminars.

GED 548 The Classroom As a Micro World (4)

Presents the classroom as a micro-world to study organization and forms of transfer of learning that speed up the learning process. Compares the elements of physical places and government organizations in the classroom as they apply to the California State Curriculum.

GED 549 Developing Curriculum Presentations with Technology (4)

Combines all the elements for long-range curriculum planning into formal visual presentations for students, parents, and educators. Minimum computer literacy is recommended, specifically the ability to use the World Wide Web on the Internet.

GED 550 Seminar in Educational Issues (4)

Intensive study of selected issues, problems, or areas in education, according to the interests of the students enrolled. Each seminar subtitled by its content. May be repeated for a maximum of 12 units. 4 seminars.

GED 560 Bilingual/Cross-Cultural Instruction: Social Studies and Language Arts (3)

Implementation of bilingual cross-cultural instruction in social studies and language arts. Effective instructional strategies to achieve curriculum objectives. 3 lectures/problem-solving.

GED 561 Bilingual/Cross-Cultural Curriculum (3)

Curriculum development in theory and practice; processes and roles in curricular development; criteria for analysis and evaluation of curricula and instructional materials; analysis and planning of bilingual/cross-cultural programs. 3 seminars.

GED 562 Bilingual/Cross-Cultural Instruction: Mathematics and Science (3)

Implementation of bilingual/cross-cultural strategies in mathematics and science, classroom individualization and evaluation. 3 lectures/problem-solving.

GED 563 Topics in Bilingual/Cross-Cultural Education (3)

Review of critical issues and topics in bilingual/cross cultural education. Refer to College of Education class schedule for specific topic each quarter. May be repeated for a total of 9 units.

GED 564 Survey of Patterns of Language for Bilingual Teaching (3)

The nature of language structure; the development of language; Barrio dialects; similarities and differences among languages; linguistic change and reconstruction. Inter-relationships between language and culture in the Chicano community. 3 seminars.

GED 565 Advanced ESL Instruction (3)

Advanced ESL instructional strategies for the non-English speaker/student. 3 lectures/problem-solving.

GED 567/567L Leadership and Public Policy in Language and Literacy: Public Policy and Facilitations (2/2)

Analysis of local, state, national and international policies, planning and legal issues related to literacy. Examination of the dynamics of interpersonal communication, multiculturalism and leadership in literacy of education. 2 seminars, 2 laboratory field experiences.

GED 568/568A Specially Designed Instruction for the Content Areas (3/1)

Inquiry into and application of specially designed academic instruction in English for access to core curricula; examination of methodologies for developing literacy and text analysis in content areas; exploration of assessment issues/methods for English-only and transitional English speakers. 3 seminars, 1 two-hour activity.

GED 569/569A Integrating Literature and the Language Arts (3/1)

Exploration of classic and contemporary juvenile literature from interdisciplinary and multicultural perspectives; approaches for integrating literature and specific student interests with the writing process and aural-oral traditions. 3 seminars, 1 two-hour activity.

GED 571/571L Graphic Design for Educational Multimedia (3/1)

Theory and application of graphic design for the electronic delivery of instruction. Explores the graphics tools and techniques used by designers of educational multimedia. 3 seminar-discussions; 1 three-hour laboratory.

GED 572/572L Instructional Design for Educational Multimedia (3/1)

Review of instructional design process based on scientific research/theory in field of human learning, applications of current research into development and design of instructional/training materials, exploring strategies/techniques for developing interactive multimedia programs for training and educational settings. 3 seminar-discussions; 1 three-hour laboratory.

GED 575/575L Video Production and Digital Video Editing (3/1)

Analysis, planning and preparation of instructional video/DVD programs; exploring the convergence of video and computers; technical aspects of QuickTime, analog and digital video, capturing/manipulating video images; examining video compressions; creating source materials, encoding video/audio, authoring, multiplexing and creating DVD discs. May be repeated twice for credit. 3 seminar/discussions; 1 three-hour laboratory.

GED 577/577L Advanced Educational Multimedia Production (3/1)

The course covers the design, planning, and production of highly interactive multimedia programs. Students work with professional authoring software such as Macromedia Director, Flash, etc. for creating interactive Web- or CD-ROM-based learning environment. 3 seminar-discussions; 1 three-hour laboratory. Prerequisites: GED 571/571L or permission of instructor

GED 578/578L Alternative Learning Environments (3/1)

An overview of salient advances in theory and practice of distance learning, the knowledge and pedagogy to develop alternative learning environments, how to think about distance education systems and make judgments about the technologies that will facilitate the teaching and learning processes. 3 seminar-discussions; 1 three-hour laboratory. Prerequisites: GED 572/572L (or concurrent enrollment), or permission of instructor.

GED 580/580L Advanced Educational Computer Programming (3/1)

The expansion of web/multimedia-based educational program production require more computer language fluency. This course offers an advanced scripting opportunity in web-based technologies such as DHTML, XML, PHP, or other languages/protocols as they appear, and in multimedia authoring programs as Lingo in educational settings, alternatively. May be repeated twice for credit. 3 seminar/ discussions; 1 three-hour laboratory. Prerequisites: GED 513/513L or permission of instructor.

GED 592/592A Learning and Instruction (3/1)

Study of contemporary issues, principles and concepts on learning theory and information processing. Overview of trends and research on assessment of learning and instruction. 3 seminars; 1 two-hour activity.

GED 593/593A Leadership in Building Multicultural Communities of Learners (3/1)

Approaches to leadership, planning, organizational behavior, and professional relations. Issues, research and trends in teacher leadership. Concepts and models of effective schools with focus on creative and cultural leadership. 3 seminars; 1 two-hour activity. Prerequisite: GED 542 and GED 592 or permission of instructor.

GED 594/594A Analysis, Development of Language and Literacy Curricula (3/1)

Examination of language/literacy curricula; development of needs assessment for language/literacy programs and formative/summative evaluations. 3 seminars, 1 two-hour activity.

GED 595/595A The Accomplished Professional Teacher (3/1)

Assessment of the roles of the professional teacher. Examination of the teacher as reflector, communicator and organizer, researcher and practitioner, scholar and leader. 3 seminars; 1 two-hour activity.

GED 596 Language, Literacy, and Human Development (4)

Introduction to literacy in the context of life-long learning in a pluralistic society. Political, economic, social and psychological factors affecting language/literacy development explored. Models of first and second language acquisition examined. 4 seminars.

GED 598 The Professional Teacher Assessment (2–6)

Capstone course for prospective candidates for the National Board for Professional Teaching (NBPT) Standard certification. Context, process and procedures for application for NBPT certification. Prerequisite: Candidates must be enrolled in the NBPT program option. May be repeated each quarter during year of certification application. 2 hour problem-solving seminar.

GED 599/599A/599L Special Topics for Graduate Students (1–4)

Study and explorations of topics of current interest related to education. Total credit limited to 12 units with a maximum of 4 units per quarter. May include lectures, seminars and /or laboratory work, activity, research, or a combination to be determined by the instructor.

GED 650 Seminar in Current Problems and Strategies in Education (4)

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. 4 seminars. May be repeated for a maximum of 12 units.

GED 690 Seminar in Educational Research (4)

Overview of research in education; emphasis on the design and implementation of research projects and theses preparation; discussion of educational issues relevant in the development of a research project. 1 three-hour seminar/discussion.

GED 691 Directed Study (1–9)

Study, research or readings of a particular problem in education directed by a faculty advisor. May be repeated for credit up to 9 units.

GED 692 Independent Study (1–6)

Independent study, research or readings proposed by the student and conducted under the supervision of a faculty member, but not leading to a thesis/project. May be repeated for credit up to 6 units.

GED 693 Conducting Educational Research (4)

Introduction to educational research. Analysis of qualitative and quantitative evaluation and research methods. Planning a research study and organization of a research report. 4 seminars.

GED 695 Master's Degree Project (3–6)

Independent research leading to successful completion of a project. Open to graduate candidates and with approval of Graduate Department Chair. Maximum credit, 9 units. Advancement to Candidacy required and approved committee form filed in the Education Department Office.

GED 696 Master's Degree Thesis (3–6)

Independent research leading to successful completion of a thesis. Open to graduate candidates and with approval of Graduate Department Chair. Maximum credit: 9 units. Advancement to Candidacy required and approved committee form filed in the Education Department Office.

GED 697 Comprehensive Examination (1)

Preparation for and completion of an examination on the subject area of the candidate's coursework listed on the degree program. Maximum credit, 2 units. Failure to complete exam satisfactorily the second time will result in termination from the program. Candidates must register through the Graduate and Professional Studies Office. Advancement to Candidacy required. Course may be taken on a credit/no credit basis.

GED 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Approval of graduate coordinator is required to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

Course Descriptions for Preliminary Administrative Services Credential, Tier I

EDU 500/500A Introduction to Secondary Student Activities (3/1)

The course provides a foundation for the successful administration of athletics and activities. Topics include legal and fiscal responsibilities, supervision, and the monitoring of the activities and athletics programs. 1 three-hour seminar.

EDU 501/501A Introduction to Secondary Athletic Programs (3/1)

The course provides the foundation for the successful administration of high school athletic programs. Topics include the legal and fiscal responsibilities of an athletic director and strategies for the organization and administration of successful high school athletic programs. 1 three-hour seminar.

EDU 505/505A Introduction to Educational Administration (3/1)

A foundation course for the Preliminary Administrative Services Credential. This introductory class in the management of schools utilizes case studies and literature from the fields of business and education. Emphasis is placed upon the role of school administrators in the creation of a positive organizational and learning climate. 1 three-hour seminar, 1 two-hour activity.

EDU 506/506A Educational Leadership (3/1)

Focus on leadership behaviors and strategies that promote effective school environments. Emphasis upon administration of human behavior, human relations skills, educational leadership styles, trends, and issues leading to effective school management. 3 seminars, 1 two-hour field activity.

EDU 510/510A Educational Administration: Organizational Behavior (3/1)

Seminar in current and innovative administrative management and service functions, models of organization and management, functions of business management, organizational theory, and decision-making for elementary and secondary schools and districts. 1 three-hour seminar, 1 two-hour field activity.

EDU 511/511A School Personnel Administration (3/1)

Emphasis upon the role of school administrators and curriculum leaders in the management and supervision of personnel. Laws and policy development in relationship to school district and collective bargaining. 1 three-hour seminar, 1 two-hour field activity.

EDU 512/512A School Law and Governance (3/1)

Examination of the evolution and current status of the law governing public schools. Analysis of California statutes, Education Codes, and court decisions affecting public education. 1 three-hour seminar, 1 two-hour activity.

EDU 513/513A School Finance (3/1)

Analysis of the historical and current economic aspects of school finance. Overview of financial and business administration in public education. 1 three-hour seminar, 1 two-hour activity.

EDU 514/514A Administration and Instructional Technology (3/1)

Emphasis upon the role of school administrators and technology in the schools. Examines use of Internet, networking and technology in schools and administration. 1 three-hour seminar, 1 two-hour field activity.

EDU 520 Candidate Performance Assessment Seminar (1)

Assessment provides a profile of the candidate for the Preliminary Administrative Services Credential (PASC). Candidates evaluate skills and knowledge for the PASC. To be taken during the last quarter of enrollment in the program. 1 seminar.

EDU 530 Fieldwork in Educational Administration (4)

A seminar designed to develop an individualized, supervised, and planned program jointly with each student and site supervisor from the employing school district. The course integrates the competency and performance domains in the standards established for educational administration by the Committee on Accreditation. Maximum credit: 8 units.

EDU 532 Professional Credential Induction Plan: Assessing for Improved Leadership (4)

A Professional Credential Induction Plan based on the candidate's needs is developed by the candidate, a coach/mentor and a University representative. The Plan will guide the candidate through advance preparation for the Tier II Credential. 1 four-hour seminar. Prerequisite: Preliminary Administrative Services Credential and employment in an administrative position.

EDU 534/534A Leadership, Policy and Schools in a Democratic Society (3/1)

The ethics of leadership and policy development are studied in relationship to schools in a democratic society. Candidates will study concepts to provide effective schools by influencing the larger political, social, economic, legal and cultural spheres of their school community. Prerequisite: Preliminary Administrative Services Credential. 1 three hour seminar, 1 two-hour activity.

EDU 535/535A Legal Aspects for Safe and Effective Schools (3/1)

The administration of school law in organizational operations is presented with an in-depth study of the Education Code together with relevant court cases. Studies cover how to interpret current court decisions, laws and regulations pertaining to special education and categorical programs and collective bargaining contracts. Prerequisite: Preliminary Administrative Services Credential. 1 three-hour seminar, 1 two-hour activity.

EDU 536/536A The Principal as Instructional Leader (3/1)

The course presents strategies for creating a culture where high student achievement is the goal for all students. Emphasis is placed on implementing best practices while utilizing California State Standards and State Assessments. Prerequisite: Preliminary Administrative Services Credential. 1 three-hour seminar, I two-hour activity.

EDU 537/537A Utilizing Fiscal and Human Resources for Safe and Effective Schools (3/1)

Candidates will learn to use systems management as a means to maximize the utilization of human potential and fiscal resources for the development of safe and instructionally effective schools. The course includes in-depth study of site and district budgeting and personnel administration. 1 three-hour seminar, 1 two-hour activity.

EDU 538/538A Ethics, Morals, and Values for Educational Leadership (3/1)

The course examines the philosophy, ethics, and moral values of educational leadership. Candidates reflect upon the theory and philosophy of educational change, core values, and examine research about ethical and moral leadership in schools. Prerequisite: Preliminary Administrative Services Credential. 1 three-hour seminar, 1 two-hour activity.

EDU 539/539A Technology and Information Systems for Management and Instruction (3/1)

The course explores the use of 21st century technology strategies and the National Technology Standards for Administrators to identify levels of candidate competency. Candidates will acquire knowledge of data-driven decision making models and the effective use of technology to both identify and communicate data trends in student achievement. Prerequisite: Preliminary Administrative Services Credential. 1 three-hour seminar, 1 two-hour activity.

EDU 540 Assessment of Professional Competency (2)

The culminating class for the Tier II Professional Administrative Services Credential is designed to assess the candidate's progress towards completion of the Professional Credential Induction Plan developed in EDU 532. Prerequisite: Preliminary Administrative Services Credential. 1 two-hour seminar.

EDU 543 Practicum I Literacy and Instructional Excellence (2)

Candidates design a custom learning experience focusing specifically on the creation of an effective school through an instnuctional focus. District and county professional workshops that improve student academic achievement and are aligned to the Professional Credential Induction Plan will be incorporated into the Practicum. Prerequisite: Preliminary Administrative Services Credential. 1 two-hour seminar.

EDU 544 Practicum II Leadership in Challenging Political and Economic Times (2)

The Practicum II is a learning experience focusing specifically on fiscal and political aspects of the effective school. The candidates will develop a plan that incorporates district, county, state, and professional workshops addressing the fiscal and political aspects of school management. Prerequisite: Preliminary Administrative Services Credential. 1 two-hour seminar.

EDU 545 Practicum III Legal Aspects for Safe and Effective Schools (2)

Practicum III specifically focuses on legal aspects for establishing a safe and effective school. The plan incorporates district and county professional workshops that address the legal aspects of school management. The plan will be based on the Candidate's Professional Induction Plan. 1 two-hour seminar.

EDU 546 Theory and Practice in Educational Leadership I (3)

An interactive problem-based seminar that integrates important concepts and theories in educational administration with problems of practice experienced in the fieldwork course. Each candidate draws upon and develops working responses to a variable menu of classroom issues ranging from legal to psychological. Corequisite: EDU 530. Prerequisites: Admission into the Great Leaders for Great Schools Academy program, EDU 510, and GED 550.

EDU 547 Theory and Practice in Educational Leadership II (3)

An interactive problem-based seminar that integrates important concepts and theories in educational administration with problems of practice experienced in the apprenticeship course. Each candidate draws upon and develops working responses to a variable menu of classroom issues ranging from legal to psychological. Corequisite: EDU 552. Prerequisites: Admission into the Great Leaders for Great Schools Academy program, EDU 510, EDU 530, EDU 546, and GED 550..

EDU 548 Theory and Practice in Educational Leadership III (3)

An interactive problem-based seminar that integrates important concepts and theories in educational administration with problems of practice experienced in the apprenticeship course. Each candidate draws upon and develops working responses to a variable menu of classroom issues ranging from legal to psychological. Corequisites: EDU 551 and EDU 553. Prerequisites: Admission into the Great Leaders for Great Schools Academy program, EDU 510, EDU 530, EDU 546, EDU 547, EDU 549, EDU 550, EDU 552, and GED 550.

EDU 549 Learning to Lead Content Module I (2)

Seminar designed to address key administrative proficiencies in the Pomona Unified School District. Topics will address the skills and resources necessary to help Administrators manage data to promote powerful teaching/learning and take leadership in meeting the curricula and programmatic needs of English Language Learners. A variety of instructional methods will be used.Corequisites: EDU 530 and EDU 546. Prerequisites: Admission into the Great Leaders for Great Schools Academy program, EDU 510, and GED 550.

EDU 550 Learning to Lead Content Module II (2)

Seminar designed to address key administrative proficiencies in the Pomona Unified School District. This module focuses on the law and compliance issues. Laws studied include state laws, Pomona Unified District policies, and collective bargaining agreements. District resources to assist in carrying out supervisory, evaluative, and supportive roles are also examined. A variety of instructional methods will be used. Corequisites: EDU 547 and EDU 552. Prerequisites: Admission into the Great Leaders for Great Schools Academy program, EDU 510, EDU 546, EDU 549, and GED 550.

EDU 551 Learning to Lead Content Module III (2)

Seminar designed to address key administrative proficiencies in the Pomona Unified School District. This module focuses on effective communication strategies and practices for Administrators and on master scheduling and the use of administrative technologies. A variety of instructional methods will be used. Corequisites: EDU 548 and EDU 553. Prerequisites: Admission into the Great Leaders for Great Schools Academy program, EDU 510, EDU 530, EDU 546, EDU 547, EDU 549, EDU 550, EDU 552, and GED 550.

EDU 552 Administrative Apprenticeship I (4)

An experiential learning practicum designed to provide candidates with hands-on experiences in all roles and responsibilities of a school administrator in the Pomona Unified School District. Corequisites: EDU 547 and EDU 550. Prerequisites: Admission into the Great Leaders for Great Schools Academy program, EDU 510, EDU 530, EDU 546, EDU 549,

and GED 550.

EDU 553 Administrative Apprenticeship II (4)

An experiential learning practicum designed to provide candidates with hands-on experiences in all roles and responsibilities of a school administrator in the Pomona Unified School District. Corequisites: EDU 548 and EDU 551. Prerequisites: Admission into the Great Leaders for Great Schools Academy program, EDU 510, EDU 530, EDU 546, EDU 547, EDU 549, EDU 550, EDU 552, and GED 550.

EDUCATIONAL LEADERSHIP

Doctor of Education in Educational Leadership

Phyllis A. Hensley, Doctoral Program Director

The independent Ed.D. Program in Educational Leadership will be offered in January 2011 pending approval of the California State University System and the Western Association of Schools and Colleges. This program is a rigorous research based advanced degree that is designed to prepare educational leaders with the knowledge, skills and dispositions to effectuate reform in California's pre-Kindergarten through grade 12 schools and the State's community colleges. The program develops leaders who can apply the critical skills of analysis, inquiry, research and evaluation to advance educational practice and successful educational reform. The program is focused on practice and on applying research tools to the challenges administrators confront in real world context.

The previous Joint Doctorate in Educational Leadership, in collaboration with the University of California, Irvine, will no longer be offered. Students are no longer admitted to the joint doctoral programs in Educational Leadership with the University of California, Irvine, as of the Winter Quarter, 2007. A plan has been developed to ensure that all students who were enrolled in the previous joint doctorate are given the opportunity to complete the degree requirements within an appropriate amount of time.

ADMISSION TO THE PROGRAM

Requirements for admission shall apply to all Ed.D. applicants and shall include at minimum:

1. A completed application form and payment of application fee
2. An earned baccalaureate degree and master's degree from an accredited institution of higher education with a cummulative grade point average of 3.0 or higher in upper-division and graduate study combined
3. Official transcripts from each college or university attended since high school graduation
4. Submission of Graduate Record Examination (GRE) scores from three sections of the General Test, taken within five years of applying to the programs, with a recommended score of 1000 or higher
5. Three confidential letters of recommendation from professionals in the field attesting to both the leadership ability and scholarship potential of the candidate; included shall be one letter from a school site or university administrator and at least one letter from a university faculty member preferably with a doctoral degree that addresses the applicant's potential for academic success in a doctoral program
6. A written statement of purpose; a narrative of one to three pages which demonstrates an understanding of the challenges facing the public schools or community colleges/institutions of higher education in California
7. A written detailed plan indicating the candidate's plan for meeting the demands of the program and his/her professional responsibilities
8. Sufficient preparation for, experiences in, and potential for educational leadership to benefit from Cal Poly Pomona's doctoral program
9. Demonstrated educational leadership potential and skills including successful experience in Pre K-12 schools, postsecondary, community, and/or policy leadership
10. Demonstrated academic excellence, problem-solving ability, technology proficiency, and interest in critically assessing and bringing about improvements to current educational policies and practices and
11. A personal interview.

DEGREE REQUIREMENTS

The program can be completed with three years of part-time graduate study. Courses are taken at Cal Poly Pomona. Ed.D. degree conferral shall require successful completion of three major examinations and a dissertation. Students shall be required within two attempts to pass each major examination and successfully complete a dissertation.

1. The *qualifying examination* shall include a rigorous written assessment of student knowledge; the examination must be passed prior to the student's advancement to candidacy.
2. The *dissertation proposal examination* shall evaluate the candidate's readiness to proceed with the dissertation research. Passing this examination shall constitute formal approval for the candidate to proceed with the proposed dissertation research, subject to Institutional Review Board approval.
3. The *dissertation* shall be the written product of systematic research on a significant educational issue.
4. The *final examination* shall be an oral defense of the candidate's dissertation.

COLLEGE OF ENGINEERING

www.csupomona.edu/engineering

Donald P. Coduto, Interim Dean
Cordelia Ontiveros, Associate Dean

Master of Science in Engineering

Master of Science in Civil Engineering

Master of Science in Electrical Engineering

Master of Science in Engineering Management

Master of Science in Mechanical Engineering

All undergraduate engineering programs are accredited by the Engineering Accreditation Commission of ABET. The programs in Engineering Technology are accredited by the Technology Accreditation Commission of ABET. The address, phone number, and URL of ABET are:

ABET, Inc.
111 Market Place, Suite 1050
Baltimore, MD 21202
(410) 347-7700
www.abet.org

ADMISSION TO THE PROGRAMS

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

Successful applicants will be admitted to the programs either unconditionally or with conditions imposed on them. To receive unconditional admission, an applicant must satisfy at least these criteria:

1) The applicant must hold a baccalaureate degree in engineering from a program that has been accredited by the Accreditation Board for Engineering and Technology (ABET) and for which the accreditation was in effect at the time of award of the degree. The degree must have been granted within five years prior to the proposed beginning of the graduate program. A baccalaureate degree in engineering technology does not satisfy this criterion.
2) The applicant must have achieved a grade point average of at least 3.00 in all undergraduate upper division coursework in mathematics, science and engineering and, additionally, in all coursework attempted with graduate standing.
3) Additional requirements may be imposed by individual programs.

Conditional admission may be granted in cases in which the applicant's academic preparation for graduate study is such that criteria 1) and/or 2) above are not satisfied. In such cases, the applicant is required to submit recent test scores of the Graduate Record Examination, letters of recommendation, and other documents attesting to the applicant's aptitude for graduate studies. Applicants who do not satisfy criterion 1) may be required to take a limited number of preparatory courses with no degree credit. Criterion 3) above must be met. When an applicant is admitted conditionally, the conditions to be met and the time allowed for meeting them are stated in the letter of admission. If these conditions are not satisfied, the student may be disenrolled.

PROGRAM REQUIREMENTS

Admission to a program does not admit a student to candidacy for a degree. Advancement to Candidacy is granted a student upon the recommendation of the graduate faculty and implies a readiness to attempt the thesis or comprehensive examination. Students who are not candidates are not eligible to register for EGR 692 or 696.

In order to advance to candidacy for the Master of Science in Engineering degree, the Master of Science in Electrical Engineering degree, the Master of Science in Engineering Management degree, the Master of Science in Mechanical Engineering degree, or the Master of Science in Civil Engineering degree; the student must:

1) satisfy all admissions conditions, if any;
2) complete at least 32 units of graduate coursework with a grade point average of 3.0 or better;
3) satisfy the Graduation Writing Test; and
4) with the assigned advisor, develop and file a formal Program of Study with proper approval.

The program of study must be submitted for approval before the end of the second quarter of attendance.

At the time of filing of the program of study, the student must opt for publishing a thesis or performing a project as a culminating experience of his/her graduate education after completing the required coursework. The thesis effort is intended to involve independent research by the student with the goal of advancing knowledge in a specialized area. The thesis effort includes a defense of the effort by the student before a committee of faculty members. The project is a one-quarter case study or research, which concludes with a written report and an oral defense of the project conducted by a committee of faculty members. Information regarding the thesis and project is available at the Engineering Graduate Studies Office.

In addition, each student is responsible for satisfying all university requirements specified elsewhere in the catalog.

CURRICULAR REQUIREMENTS

General requirements for advanced degrees are found in the Graduate Scholastic Requirements section of this catalog. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total of 13 transfer, Extended University, or units petitioned for graduate credit, or any combination of 13 units, may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.

Technical specialty courses are chosen to emphasize an area that is a logical continuation of the student's undergraduate and graduate preparation. At most, one 400-level course may be included in this category, and a maximum of 4 transfer units can be used to satisfy this requirement.

The remainder of the courses in the student's program of study will be chosen in collaboration with an advisor to insure consistency with undergraduate preparation and graduate goals, and to assure an integrated educational experience. A course in the program of study may be taken only after the student has satisfied the course prerequisites for enrolling in the course. It is the student's responsibility to satisfy all prerequisites for a course before enrolling in the course.

Engineering graduate students may be granted graduate credit only for

courses numbered 400 and above. A grade point average of 3.0 (B) or better must be maintained in all upper-division and all graduate courses. Candidates must be enrolled in the university during the quarter of graduation.

ENGINEERING GRADUATE COURSE DESCRIPTIONS

EGR 509 Advanced Differential Equations for Engineers (4)

An advanced course in applied differential equations. Multi-disciplinary engineering models are developed and solved. Analytical and numerical techniques for solving differential systems with either a single independent variable or multiple independent variables are used. 4 lectures/problem-solving. Prerequisite: Undergraduate course in differential equations.

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, applications in thermodynamics, machine design, systems analysis, and reliability. 4 lectures/problem-solving. Prerequisite: Undergraduate course in probability theory.

EGR 511 Numerical Modeling (4)

Advanced interpolation and approximation methods. Advanced integration concepts. Solution of ordinary differential equations. systems of differential equations, statistical methods. Applications to electrical networks, transport phenomena, structural systems, dynamic systems, etc. 4 lectures/problem-solving. Prerequisite: Undergraduate course in numerical analysis or consent of instructor.

EGR 512 Vector Analysis and Complex Variables (4)

Vector and scalar fields. Gradient, divergence, curl. Green's and Stokes' theorems. Complex functions and conformal mapping. Applications in electrodynamics, heat transfer, fluid dynamics and aerodynamics. 4 lectures/problem-solving. Prerequisite: Mathematics equivalent to ABET-accredited curriculum.

EGR 513 Engineering Tensor Analysis (4)

Vector-tensor notation and operations. Generalized coordinate systems. Tensor algebra and calculus. Transport and conservation laws in continuum mechanics. Formulation and modeling of engineering phenomena. 4 lectures/problem-solving. Prerequisite: Mathematics equivalent to ABET-accredited curriculum.

EGR 514 Variational Methods in Engineering (4)

Calculus of variations. Approximate methods. Applications in fluid dynamics, heat transfer, dynamics, structures. 4 lectures/problem-solving. Prerequisite: Mathematics equivalent to ABET-accredited curriculum.

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. 4 lectures/problem-solving. Prerequisite: Mathematics equivalent to ABET-accredited curriculum.

EGR 524L Advanced Aerospace Vehicle Design (2)

Preliminary design of aerospace systems. Interdisciplinary concepts in design. System analysis and integration. Design optimization. Design compromise in multidisciplinary systems. Trades study evaluations. Verbal and written presentation of system design. Individual and team projects. 2 three-hour laboratories. Prerequisite: completion of 24 units of graduate level coursework.

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. 4 lectures/problem-solving. Prerequisite: Upper-division course in high-speed aerodynamics.

EGR 537 Polymer Fluid Dynamics (4)

The structure, flow phenomena, and material functions for polymeric fluids. Constitutive equations available to solve polymeric fluid dynamics problems. Applications in plastics manufacturing, performance of lubricants, processing of food-stuffs, and movement of biological fluids. 4 lectures/problem-solving. Prerequisites: Upper-division courses in heat transfer, fluid mechanics, and EGR 513.

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. 4 lectures/problem-solving. Prerequisite: 3 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. 4 lectures/problem-solving. Prerequisite: Upper-division course in human engineering principles.

EGR 540 Systems Theory (4)

Application of matrix theory and linear vector spaces to the mathematical representation of systems. Analysis of the state equations for linear, time varying and invariant, continuous and discrete systems, controllability and observability for linear systems. 4 lectures/problem-solving. Prerequisite: EGR 515. (Some previous exposure to Laplace Transforms is recommended.)

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. 4 lectures/problem-solving. Prerequisite: Upper-division course in engineering thermodynamics.

EGR 547 Process Modeling and Analysis (4)

Mathematical modeling of physical and chemical processes. Analytical and numerical solutions for steady and unsteady state problems. Design project based on results of modeling. 4 lectures/problem-solving. Prerequisite: Baccalaureate degree in Chemical Engineering or consent of the instructor.

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 extension, dynamic and integer programming, queuing theory, network analysis, game theory and decision theory. 4 lectures/problem-solving. Prerequisite: Upper-division course in operations research.

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. 4 lectures/problem-solving. Prerequisite: Undergraduate course in programming.

EGR 572 Total Quality Management in Engineering (4)

Introduction to the principles and practices of Total Quality Management (TQM). The course will also cover the tools and techniques for understanding and implementing TQM. A practical state-of-the-art approach will be used. Applications in service, manufacturing, government, military, construction, education, small business, health care, and nonprofit organizations will be presented. 4 lectures/problem-solving. Prerequisite: consent of instructor.

EGR 573 Advanced Operations Planning and Control Systems (4)

Operations analysis of integrated production systems; mathematical and computer models for planning, scheduling, and control of production and service systems. Statistical techniques in forecasting; optimization of resources utilization. 4 lectures/problem-solving. Prerequisite: Upper-division course in operations research.

EGR 574 Advanced Facilities Planning (4)

Planning, analyzing, justifying, controlling, and evaluating physical facilities. Long- and short-range facilities plans, decision criteria, authorization and control procedures, post completion audits. Resource allocation, optimization, simulation, and computer techniques. Technical, economic, ecological, safety, and intangible factors. Case studies. 4 lectures/problem-solving. Prerequisite: Undergraduate course in engineering economy.

EGR 575 Inlet Design (4)

Subsonic, supersonic and hypersonic inlet design. Subsonic inlets: friction loss, diffusion, plenum chambers, pressure recovery. Transonic effects: pre-entry flow, separation, shock-boundary layer interaction. Supersonic compression: external, internal, boundary layer bleed. Cowl design. Additive drag. Flow distortion. Matching and control. Applications to aircraft and helicopters. 4 lectures/problem-solving. Prerequisites: Undergraduate courses in gas dynamics and propulsion.

EGR 577 Aerodynamics of Wings and Bodies (4)

Three-dimensional wings; steady, subsonic flow; supersonic flow. Lifting line theory: span-wise lift distribution, induced drag, twist, sweepback. Introduction to lifting surface theory: planar, nonplanar, interference. Transonic small-disturbance flow. Unsteady flow. Conical flows. 4 lectures/ problem-solving. Prerequisite: Undergraduate courses in gas dynamics and aerodynamics.

EGR 578 Aircraft Stability (4)

General equations of unsteady motion. Stability derivatives. Stability of uncontrolled motion; longitudinal, lateral. Response of the vehicle to actuation of the controls. Flight in turbulent air. Automatic stability and control. Specialization to missiles. Simulation. Transfer functions. 4 lectures/problem-solving. Prerequisite: Undergraduate course in aircraft stability and control, or consent of instructor.

EGR 579 Vibration and Flutter (4)

Two- and three-dimensional flutter theory. Structural damping. Aerodynamics forces. Flutter stability. Non-linear characteristics. Aspect ratio and compressibility effects. Empennage vibration and flutter analysis. Wing torsional divergence, aileron reversal and effectiveness. Modeling concepts. 4 lectures/problem-solving. Prerequisites: Upper-division courses in aerodynamics, structures and dynamics and EGR 515.

EGR 580 Materials for Electronics (4)

Preparation techniques for materials used in electronic devices. Structure and purity control. Crystal growth, epitaxy, vapor deposition, magnetic domains, and solid state phase transformations. Current problems concerning Si and III-V compound device production and research. 4 lectures/problem-solving. Prerequisite: An undergraduate course in materials science.

EGR 583 Aerodynamic Heating (4)

Fundamental equations. Laminar and turbulent boundary layer properties. Laminar and turbulent skin friction. Recovery temperature. Reference enthalpy method. Slip flow. Free molecule flow. Stagnation point heat transfer. Mass transfer cooling. Calculation of skin temperature. 4 lectures/problem-solving. Prerequisites: Undergraduate courses in heat transfer and gas dynamics.

EGR 595 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. 4 lectures/problem-solving. Prerequisite: ME 535 or EGR 535 or consent of instructor.

EGR 596 Research Methods (2)

Introduction to research methods with emphasis on preparing an engineering thesis problem statement. This course prepares engineering graduate candidates for writing theses and independent research papers. Writing problem statements; research questions; experimental and non-experimental design; sampling; instrument design. 2 discussions. Prerequisite: completion of all required breadth courses on contract.

EGR 599/599A/599L Special Topics for Graduate Students (2–4)

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 instructor.

EGR 624L Advanced Aerospace Vehicle Design (2)

Completion of the design of an interdisciplinary aerospace vehicle system. Preparation of a final report on the project together with an oral briefing to an industrial design review panel. 2 three-hour laboratories. Prerequisite: EGR 524. Unconditional standing required.

EGR 691 Directed Study (1–2)

Case study or investigation of selected engineering problems under the direction of a graduate faculty member. May be repeated as needed for a maximum of 6 units. Students must register through the Engineering Graduate Studies Office. The study should be in the student's emphasis area and should conclude with a written report. May be combined with EGR 692. Unconditional standing required.

EGR 692 Master's Degree Project (2)

Independent study leading to successful completion of a graduate project in the student's emphasis area. The topic of study must be pre-approved by a graduate faculty committee. The study should conclude with an individual report and an oral defense of the project. Prerequisite: advancement to candidacy.

EGR 696 Master's Degree Thesis (2)

Independent investigation intended to be an extension of an existing body of knowledge into an area not thoroughly investigated before, directed by a committee of graduate faculty members, and resulting in a published thesis. Must be repeated as appropriate. Students must register through the Engineering Graduate Studies Office. Credit assigned upon successful completion of entire thesis and approval of the committee. Total credit, 4, 6 or 8 units. Advancement to Candidacy required.

EGR 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Approval of Dean or designee is required to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

AEROSPACE ENGINEERING

Master of Science in Engineering with Emphasis in Aerospace Engineering

In the Department of Aerospace Engineering, College of Engineering

www.csupomona.edu/aro

Ali R. Ahmadi, Chair and Graduate Coordinator

The practice-oriented Master of Science in Engineering with emphasis in Aerospace Engineering (MSE_AE) program builds upon an undergraduate education and facilitates more advanced study in aerospace engineering.

MISSION STATEMENT

The Master of Science in Engineering with emphasis in Aerospace Engineering (MSE_AE) program is intended to serve both full-time and part-time graduate students who have a BSAE or a closely-related undergraduate degree in order to strengthen their knowledge and understanding of aerospace engineering principles and practices. The program is primarily intended for students who currently are, or intend to become, practicing aerospace engineers, and thus focuses on the application of these principles and practices to real-world problems encountered by professional aerospace engineers.

Another purpose of the program is to facilitate applied research on relevant aerospace engineering topics. Such research should 1) serve societal needs by addressing contemporary issues, 2) contribute to the professional development of both students and faculty and 3) provide preparation for further academic study and research for those students who wish to pursue a Ph.D.

EDUCATIONAL OBJECTIVES

Graduates of the Master of Science in Engineering with emphasis in Aerospace Engineering program shall have:

- Knowledge of aerospace engineering principles, in aerodynamics, aerospace structures, flight mechanics, orbital mechanics, aerospace propulsion and aerospace vehicle design.
- The ability to conduct engineering analyses and to develop and implement designs and problem solutions.
- An understanding of the various technical and non-technical factors that impact the feasibility and implementation of aerospace engineering projects.
- The foundation needed to develop engineering judgment via professional practice, and to effectively identify, consider and account for multiple and competing objectives.
- The technical knowledge and skills needed to pursue life-long learning, with the ability to independently extend personal knowledge and understanding of engineering topics and practices by conducting literature searches, consulting with others, and using other similar techniques.

ADMISSION TO THE PROGRAM

Applicants for unconditional admission are generally expected to have a B.S. in Aerospace, Mechanical or a closely related field of engineering from an ABET accredited (or equivalent) institution within the last 5 years.

GPA in upper-division undergraduate courses in Math, Science and Engineering must be 3.0 or higher.

Applicants with an undergraduate degree in other discipline, and those who do not fully satisfy other department or university graduate admission requirements may be considered for possible conditional admission. These conditions may include additional coursework, minimum scholarship, or other requirements.

Conditionally admitted students must satisfy the specified conditions before being advanced to unconditional standing. Those who do not satisfy these conditions will be dismissed from the program.

Applicants with an upper- division GPA less than 3.0 in Math, Science and Engineering, or a B.S. degree from a non-ABET institution, or a degree received prior to 5 years ago, must submit GRE test score (quantitative plus verbal) of at least 1,100. Letters of recommendation are not required, but will be considered.

REQUIREMENTS

A minimum of 46 quarter units (equivalent to about 30 semester units) is required for the Master of Science in Engineering with emphasis in Aerospace Engineering (MSE_AE). The specific requirements are described below. All students must complete a Master's Degree Project.

Each student must, in consultation with their academic advisor, prepare a Program of Study that outlines the coursework required to complete the program. This program of study should be prepared as early as possible, and must be submitted no later than the end of the second quarter of residency.

To attain Advancement to Candidacy for the degree, the student must satisfy all of the following:

1. Complete all conditions of admission, including any preparatory courses that may have been specified.
2. Have an approved Program of Study on file.
3. Completion of at least 32 units of graduate-level coursework with a grade point average of at least 3.0.
4. Pass the graduation writing test or receive a waiver.

CURRICULUM

Required Courses (28 units)

Numerical Modeling	EGR	511	(4)
Vector Analysis and Complex Variables	EGR	512	(4)
Aerodynamics of Wings and Bodies	EGR	577	(4)
Aerospace Structures	EGR	599	(4)
Airbreathing Propulsion Systems	EGR	599	(4)
Aircraft Stability	EGR	578	(4)
Astronautics	EGR	599	(4)
Master's Degree Project	EGR	692	(2)

Electives (16 units)

Select at least 8 units from the following list:

Missile Engineering	EGR	599	(4)
Aircraft and Spacecraft Design	EGR	599	(4)
Hypersonic Aerodynamics	EGR	528	(4)
Computational Fluid Dynamics	ME	632	(4)
Finite Element Analysis	CE	526	(4)
Structural Dynamics	CE	521	(4)

Elective courses may include up to 8 units of approved 400-level courses that are relevant to the program of study, so long as these or equivalent courses have not already been used for credit toward an undergraduate degree. Approved courses are:

Aircraft Stability and Control	ARO	405	(4)
Rocket Propulsion	ARO	414	(4)
Mechanics of Composite Materials	ARO	436	(4)

CIVIL ENGINEERING

MASTER OF SCIENCE IN CIVIL ENGINEERING

In the Department of Civil Engineering, College of Engineering

www.csupomona.edu/ce

Francelina A. Neto, Interim Chair
Lisa Yunxia Wang, Graduate Coordinator

The practice-oriented Master of Science in Civil Engineering (MSCE) program builds upon an undergraduate education and facilitates more advanced study in one of the branches of civil engineering. Students must select one of three emphasis areas: Geotechnical Engineering, Structural Engineering, or Transportation Engineering.

MISSION STATEMENT

The Master of Science in Civil Engineering (MSCE) program is intended to serve both full-time and part-time graduate students who have a BSCE or closely-related undergraduate degree in order to strengthen their knowledge and understanding of civil engineering principles and practices. The program is primarily intended for students who currently are, or intend to become, practicing civil engineers, and thus focuses on the application of these principles and practices to real-world problems encountered by professional civil engineers.

Another purpose of the program is to facilitate applied research on relevant civil engineering topics. Such research should 1) serve societal needs by addressing contemporary issues, 2) contribute to the professional development of both students and faculty and 3) provide preparation for further academic study and research for those students who wish to pursue a Ph.D. degree.

EDUCATIONAL OBJECTIVES

Graduates of the Master of Science in Civil Engineering program shall have:

- Knowledge of engineering principles sufficient to understand the bases and applicability of standard analysis, design, and implementation practices within their emphasis area.
- The ability to conduct engineering analyses and to develop and implement designs and problem solutions that conform to applicable codes and standards of practice.
- An understanding of the various technical and non-technical factors that impact the feasibility and implementation of civil engineering projects, including technical feasibility, multi-party involvement, environmental assessment, financial-economic planning, owner-public works administration, owners' strategic plans, and socioeconomic-equity issues.
- The foundation needed to develop engineering judgment via professional practice, and to effectively identify, consider and account for multiple and competing objectives.
- The technical knowledge and skills needed to pursue life-long learning, with the ability to independently extend personal knowledge and understanding of engineering topics and practices by conducting literature searches, consulting with others, and using other similar techniques.
- The ability to apply knowledge in a specialized area related to civil engineering as defined in the American Society of Civil Engineers body of knowledge requirements.
- Knowledge and skills necessary to pass specialty license examinations in their respective areas, including the examinations required for registration as a Structural Engineer, Geotechnical Engineer and Traffic Engineer.

ADMISSION TO THE PROGRAM

Applicants for unconditional admission are generally expected to have a BSCE degree from an ABET accredited (or equivalent) civil engineering program, with a GPA of at least 3.0 in their upper-division engineering courses. Additional qualifications, such as EIT or PE license, professional experience, or other noteworthy accomplishments may be listed in the application's statement of purpose and will be considered. Also see the university graduate admission requirements in the graduate studies section of this catalog.

Applicants with an undergraduate degree in another discipline, and those who do not fully satisfy other department or university graduate admission requirements, may be considered for possible conditional admission. These conditions may include additional coursework, minimum academic performance, or other requirements.

Conditionally admitted students must satisfy the specified conditions before being advanced to unconditional standing. Those who do not satisfy these conditions will be dismissed from the program.

Applicants with an overall undergraduate GPA less than 3.0 or an upper-division engineering GPA less than 3.0 must submit GRE (general) scores. Letters of recommendation are not required, but will be considered.

REQUIREMENTS

A minimum of 45 quarter units (equivalent to 30 semester units) is required for the Master of Science in Civil Engineering degree. The specific requirements for each emphasis area are described below. All students must complete either a Master's project or a Master's thesis.

Each student must, in consultation with their academic advisor, prepare a program of study that outlines the coursework required to complete the program. A preliminary program of study should be prepared as early as possible, and must be submitted to the advisor no later than the end of the second quarter of residency.

The finalized program of study must be submitted during the third quarter of residency, before the start of the registration period for the fourth quarter.

To attain Advancement to Candidacy for the degree, the student must satisfy all of the following:

1. Completion of all conditions of admission, including any preparatory courses that may have been specified.
2. Have an approved program of study on file
3. Be in good academic standing with a grade point average of at least 3.0
4. Passed the graduation writing test or received a waiver

Please check the Civil Engineering Department website for additional information.

CURRICULUM

All students must select one of the following emphasis areas:

The Geotechnical Engineering emphasis encompasses the interactions between civil engineering projects and the ground that supports them, and includes studies in foundations, earth and rock slopes, tunnels, earth retaining structures, groundwater, earthquakes, and other related topics.

The Structural Engineering emphasis includes methods of designing buildings and other structures from a wide range of building materials, and includes emphases on seismic design and other topics.

The Transportation Engineering emphasis covers transportation facility design, traffic flow and signalization, transportation planning and policy, public transit, pavement design, airport engineering, and intelligent transportation systems.

GEOTECHNICAL ENGINEERING EMPHASIS

Required Courses (25-29 units)

Applied Probability Concepts in CE	CE	502	(4)
Advanced Soil Mechanics I	CE	531	(4)
Advanced Soil Mechanics II	CE	532	(4)
Subsurface Exploration and Characterization	CE	533/L	(3/1)
Research Methods	CE	690	(1)
Master's Project	CE	695	(4)
or Master's Thesis	CE	696	(8)
Engineering Geology II	GSC	415/L	(3/1)

Electives (16–20 units)

Select from the following list:

Advanced Foundation Engineering	CE	534	(4)
Earth Slope Engineering	CE	536	(4)
Rock Mechanics	CE	538	(4)
Earth Retaining Structures	CE	540	(4)
Geotechnical Earthquake Engineering	CE	542	(4)
Pavement Design	CE	588	(4)
Special Topics for Graduate Students	CE	599/A/L	(1-4)
Other approved coursework outside geotechnical engineering			(0-8)

Elective courses may include up to 4 units of approved 400-level courses that are relevant to the program of study, so long as these or equivalent courses have not already been used for credit toward an undergraduate degree. Approved courses include, but are not limited to, the following:

Foundation and Retaining Wall Design	CE	424	(4)

STRUCTURAL ENGINEERING EMPHASIS

Required Courses (29-33 units)

Advanced Engineering Mathematics	CE	501	(4)
Advanced Steel Design	CE	517	(4)
Structural Dynamics	CE	521	(4)
Advanced Reinforced Concrete Design	CE	522	(4)
Introduction to Finite Element Analyses	CE	526	(4)
Earthquake-Resistant Design of Structures	CE	528	(4)
Research Methods	CE	690	(1)
Master's Project	CE	695	(4)
or Master's Thesis	CE	696	(8)

Electives (12–16 units)

Select from the following list:

Stability of Structures	CE	518	(4)
Advanced Masonry Design	CE	519	(4)
Prestressed Concrete Design	CE	523	(4)
Advanced Foundation Engineering	CE	534	(4)
Earth Retaining Structures	CE	540	(4)
Geotechnical Earthquake Engineering	CE	542	(4)
Special Topics for Graduate Students	CE	599/A/L	(1-4)
Other approved coursework outside structural engineering			(0-8)

Elective courses may include up to 8 units of approved 400-level courses that are relevant to the program of study, so long as these or equivalent courses have not already been used for credit toward an undergraduate degree. Approved courses include, but are not limited to, the following:

Structural Design - Steel	CE	406	(4)
Structural Design – Reinforced Concrete	CE	421	(4)
Foundation and Retaining Wall Design	CE	424	(4)
Structural Design - Timber	CE	433/L	(2/1)
Masonry Design	CE	442	(4)
Bridge Design	CE	476	(4)
Computer Methods of Structural Analysis	CE	488	(4)

TRANSPORTATION ENGINEERING EMPHASIS

Required Courses (21-25 units)

Applied Probability Concepts in CE	CE	502	(4)
Design of Transportation Facilities	CE	580	(4)
Traffic Flow Analysis	CE	582	(4)
Transportation Administration and Policy	CE	584	(4)
Research Methods	CE	690	(1)
Master's Project	CE	695	(4)
or Master's Thesis	CE	696	(8)

Electives (20–24 units)

Select from the following list:

GIS Applications in Civil Engineering	CE	505	(4)
Public Transportation	CE	586	(4)
Pavement Design	CE	588	(4)
Signal Design, Operations, and Control	CE	590	(4)
Intelligent Transportation Systems	CE	591	(4)
Transportation Planning Analysis	CE	592	(4)
Airport Engineering	CE	594	(4)
Special Topics for Graduate Students	CE	599/A/L	(1-4)
Seminar in Transportation Economics	EC	659	(4)
Regional Transportation Planning and Policy	URP	535	(4)
Other approved coursework outside transportation engineering			(0-8)

Elective courses may include up to 8 units of approved 400-level courses that are relevant to the program of study, so long as these or equivalent courses have not already been used for credit toward an undergraduate degree. Approved courses include, but are not limited to, the following:

Urban Transportation	CE	428/L	(3/1)
or Urban Transportation Planning	URP	488/L	(3/1)
Traffic Engineering	CE	429/L	(3/1)
Advanced Highway Design	CE	480/L	(3/1)
Economics of Transportation	EC	433	(4)

GRADUATE COURSE DESCRIPTIONS

NOTE: For undergraduate prerequisite course descriptions, please see undergraduate section.

CE 501 Advanced Engineering Mathematics (4)

Matrices, eigenvalue problems, differential equations, partial differential equations, Fourier series and Fourier transforms. 4 lectures/problem solving. Prerequisites: MAT 214 and MAT 216, or MAT 224, and graduate standing.

CE 502 Applied Probability Concepts in Civil Engineering (4)

Modeling uncertainty in civil engineering projects. Probability theory and statistical techniques. Temporal and spatial sampling and estimation. Utility theory. Stochastic processes including Markov process. Queue

theory and models. Monte Carlo simulation. Reliability and reliability-based design. Applications of probability and statistics for risk assessment in civil engineering. 4 lectures/problem solving. Prerequisites: IME 301 or STA 309, and graduate standing.

CE 505 GIS Applications in Civil Engineering (4)

Introduction to fundamental concepts and techniques of geographic information systems (GIS). GIS applications in transportation, environmental assessment, water resources management, geo-environmental analyses and other areas in civil engineering. 4 lecture/problem solving. Prerequisite: Graduate standing or instructor's approval.

CE 510 Theory of Plates and Shells (4)

Analysis of plates and shells; bending of thin plates. Fourier solution of simply supported rectangular plates; plates of various shapes and boundaries; plates subject to bending and in-plane membrane type forces; plates on elastic foundations, cylindrical shells, finite difference methods; finite element methods; SAP-2000 and its application to plates and shell-type structures. 4 lecture/problems solving. Prerequisites: CE 305, CE 501, and graduate standing.

CE 517 Advanced Steel Design (4)

Structural analysis and design of steel structures under static and earthquake loads. Ductility requirement on seismic design. Behavior and design of steel elements for global and local buckling. Plastic analysis and its application. Design code provisions for special moment resisting, braced, and eccentric braced frames. Design of composite beams. Design of connections. Load and resistance factor design (LRFD). 4 lectures/problem-solving. Prerequisites: CE 406 and graduate standing.

CE 518 Stability of Structures (4)

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 of frames. 4 lectures/problem solving. Prerequisites: CE 305, CE 501, and graduate standing.

CE 519 Advanced Masonry Design (4)

Design and analysis of reinforced masonry structural elements including lintel beams, pilasters, and shear walls. Flexural strength, shear strength, stiffness, and ductility of reinforced masonry elements. Detailing of reinforcement and design of connections. Design for seismic loads. Procedures of both working stress design and strength design. 4 lectures/problem-solving. Prerequisites: CE 442 and graduate standing.

CE 521 Structural Dynamics (4)

Concepts of the dynamics of elastic bodies. The free and forced vibration response of single and multi-degree-of-freedom systems. Duhamel's integral. Response spectra. Linearization of the equations of motion. Free- and forced- vibration response to continuous systems of longitudinal, transverse and torsional vibrations of structural elements. 4 lectures/problem-solving. Prerequisites: CE 501, or ARO 327, or ARO 406, or equivalent, and graduate standing.

CE 522 Advanced Concrete Design (4)

Advanced design of building frame and shear wall structures. Design of slender columns and two-way slabs. Design of connections. Reinforced concrete system evaluation for seismic resistance including confinement and ductility requirement. Seismic design of shear walls. 4 lectures/problem-solving. Prerequisites: CE 421 and graduate standing.

CE 523 Prestressed Concrete Design (4)

Design of prestressed concrete structures. Methods of prestressing. Pretensioning and post-tensioning techniques. Properties of concrete and prestressing steels. Design for flexure, shear, torsion, camber and deflections. Design considerations on anchorage/bonding of cables/wire. 4 lecture/problem solving. Prerequisites: CE 421 and graduate standing.

CE 526 Finite Element Analysis (4)

Theory and application of finite element analysis, topics covered in this course are focused on the structural engineering aspects of the FEM, which are: 1D elements, bars and beams; 2D elements, plates and shells; 3D elements, isoparametric elements; static and dynamic analysis; linear and nonlinear analysis; modeling issues and considerations; and commercial software usage. 4 lectures/problem-solving. Prerequisites: CE 305 and CE 501, or ARO 329 or equivalent, and graduate standing.

CE 528 Earthquake-Resistant Design of Structures (4)

Introduction to fundamental concepts in seismic design of structures. Characterization of earthquakes for design. Time-history analysis. Response spectral analysis. Seismic performance of various structural systems. Basis for code design procedures. Force- and displacement-based design. 4 lectures/problem-solving. Prerequisites: CE 406, CE 421, CE 521, and graduate standing.

CE 531 Advanced Soil Mechanics I (4)

Soil as an engineering material. Stresses in soil and elastic responses to loading. Groundwater and seepage in soil; consolidation, secondary compression, and soil improvement methods to control settlement. Use of finite element seepage analysis. 4 lectures/problem-solving. Prerequisites: CE 326 and graduate standing.

CE 532 Advanced Soil Mechanics II (4)

Shear strength of soils. Theories of lateral earth pressure. Use of numerical analysis software. 4 lectures/problem-solving. Prerequisites: CE 531 and graduate standing.

CE 533/L Subsurface Exploration and Characterization/Laboratory (3/1)

Methods and techniques of exploring subsurface soil, rock, and groundwater conditions. Obtaining samples, in-situ and laboratory testing to determine engineering properties. Interpretation of field and laboratory results to develop engineering parameters for design. 3 lectures/problem-solving, one 3-hour laboratory. Prerequisites: CE 532 and graduate standing.

CE 534 Advanced Foundation Engineering (4)

Analysis and design of mat foundations. Analysis and design of deep foundations to resist both vertical and lateral loads. Soil-structure interaction. 4 lectures/problem-solving. Prerequisites: CE 424 and graduate standing.

CE 536 Earth Slope Engineering (4)

General slope stability concepts. Soil strength and groundwater conditions. Slope stability analysis methods. Stability charts. Field investigation and instrumentation for landslide problems. Uncertainties in slope stability analysis and quantitative risk analysis. Slope stabilization methods. Earth dam analysis and design. 4 lectures/problem-solving. Prerequisites: CE 532 and graduate standing.

CE 538 Rock Mechanics (4)

Properties of intact rock and discontinuities. Rock mass strength and deformability. In-situ rock stresses and their measurement. Groundwater flow in rock. Rock mass classification systems. Numerical methods. Analysis and design of rock slopes, tunnels, underground excavations, and rock foundations. Rock fall analysis and mitigation. Case histories in rock engineering. 4 lectures/problem-solving. Prerequisites: CE 326 and graduate standing.

CE 540 Earth Retaining Structures (4)

Lateral earth pressure. Analysis and design of retaining walls. Analysis and design of mechanically stabilized earth. Analysis and design of sheet pile walls both freestanding and anchored. Analysis and design of braced excavations and tiebacks. Analysis and design of cellular cofferdams. 4 lectures/problem-solving. Prerequisites: CE 326 and graduate standing.

CE 542 Geotechnical Earthquake Engineering (4)

Introduction to seismology and earthquakes. Seismic hazard analysis. Wave propagation. Dynamic soil properties. Ground response analysis, local site effects, and design ground motions. Soil liquefaction. Seismic slope stability analysis. Seismic design of retaining walls. Remediation of seismic hazards. 4 lectures/problem-solving. Prerequisites: CE 326 and graduate standing.

CE 580 Design of Transportation Facilities (4)

Advanced study of design of transportation facilities. It includes geometry, drainage, soils, materials, and other topics of streets and non-motorized facilities, highways, railroads, transit, and harbor/port facilities. 4 lectures/problem-solving. Prerequisites: CE 222 and graduate standing.

CE 582 Traffic Flow Analysis (4)

Analysis of properties and models of the flow of vehicles in freeway and network situations. Macroscopic and microscopic perspectives of traffic flow. Study of traffic flow phenomena. 4 lecture/discussion. Prerequisites: CE 222 and graduate standing.

CE 584 Transportation Administration and Policy (4)

Examination of the institutions, legislation, and policies that govern transportation systems and their operations and development in the U.S. Federal, State, regional and local government involvement in transportation provision and protection. Public and private partnerships in support of transportation system development. Regulations, regulatory processes and mandates, and their effect on finance, system monitoring, environmental impact reviews, and other concerns. 4 lecture/discussion. Prerequisites: CE 223 and graduate standing.

CE 586 Public Transportation (4)

Public transportation can be examined from three perspectives: system characteristics and technology, planning and operations, and management and finance. This course emphasizes the second aspect. Bus and rail transit are covered. Planning issues include stop and station location, routing and network design. Operational issues include scheduling, capacity, speed, dwell times, and others. 4 lecture/discussion. Prerequisites: CE 223 and graduate standing.

CE 588 Pavement Design (4)

Pavement design: Layered elastic theory and stress distribution. Traffic loading and volume. Pavement materials. Drainage design. Pavement performance. Design of rigid pavement. Design of flexible pavements. Pavement preservation. Prerequisite: undergraduate soil mechanics course. 4 lecture/problem solving. Prerequisites: CE 326 and graduate standing.

CE 590 Traffic Signal Control Design and Operations (4)

Introduction to traffic control systems. Types of traffic control methods. Warrants for placement of various intersection controls. Selection and placement of traffic control equipment. Signal system design and preparation of signal plans and specifications. Signal timing methods. Analysis of signalized intersection capacity and performance. Ramp metering. 4 lecture/problem-solving. Prerequisites: CE 582 and graduate standing.

CE 591 Intelligent Transportation Systems (4)

Review of the history of ITS. Study of available ITS technologies and benefits of use. Assessment of ITS case studies. 4 lecture/problem-solving. Prerequisite: Graduate standing.

CE 592 Transportation Planning Analysis (4)

Transportation demand forecasting, including the traditional four-step process and activity-based methods. Analytical components of demand modeling. Demand modeling applications using computer software. Transportation and land use modeling, including the Lowry method and integrated approaches. Emissions analysis using the current version of the MOBILE model. Role of transportation planning methods in decision-making processes. 4 lecture/ problem-solving. Prerequisites: CE 223 and graduate standing.

CE 594 Airport Engineering (4)

Introduction of aviation systems. The principal topics to be covered include aircraft performances, airport master plans, as well as planning and design of airside and landside airport facilities. Two 2-hour lectures / problem-solving. 4 lecture/problem-solving. Prerequisites: CE 223 and graduate standing. Corequisite: CE 480 or CE 580

CE 599/599A/599L Special Topics for Graduate Students (1–4)

Selected topics comprising new or experimental courses not otherwise offered. Each offering identified in the current schedule and on the student's transcript. Prerequisites: Graduate standing and as announced.

CE 690 Research Methods (1)

Emphasis on how to do applied research in civil engineering. It covers the entire research process including: 1) identifying research problems or issues, 2) formulating strategies for solving problems, 3) writing proposals, 4) developing plans and schedules, 5) conducting research, and 6) writing papers and reports. It also discusses strategies and methodologies effective in each phase of the research process. 1 seminar. Prerequisites: Completion of 24 units of graduate-level coursework applicable toward the MSCE degree, good academic standing, and graduate standing.

CE 695 Master's Project (2)

Individual and independent work based on the project proposal, plan and scheduled approved by advisor. Regular meetings and discussions with advisor. May be taken for up to 4 units total credit. Prerequisites: CE 690, advancement to candidacy, and graduate standing.

CE 696 Master's Thesis (2–3)

Individual and independent research work based on the project proposal, plan and scheduled approved by advisor. Regular meetings and discussions with advisor. Prerequisites: CE 690, advancement to candidacy, and graduate standing. May be taken for up to 8 units of

credit.

CE 699 Master's Degree Continuation (0)

Continued work on a master's project or thesis once the student has completed CE 695 or CE 696. This course permits such students to remain in residency during the graduation quarter. Prerequisites: CE 695 or CE 696, and graduate standing.

ELECTRICAL ENGINEERING

Master of Science in Electrical Engineering

In the Department of Electrical and Computer Engineering, College of Engineering

www.csupomona.edu/~ece

Salomón Oldak, Chair
Saeed Monemi, Graduate Coordinator

The Master of Science in Electrical Engineering (MSEE) provides advanced studies for graduates willing to further their knowledge in electrical engineering. Students can specialize in one of three options: Communications and Signal Processing, Computer Engineering or Control and Robotics.

MISSION STATEMENT

The Master of Science in Electrical Engineering (MSEE) program offers state of the art instruction for BSEE, BSCpE or closely related graduates who intend to supplement their initial degree. The program is intended mainly for the practicing engineer. It can be used by those students interested in performing applied research or those willing to broaden their knowledge before pursuing higher studies.

Pursuant our BSEE and BSCpE, the emphasis of the program is on advanced studies with applied training and includes laboratory instruction. Most courses however, are dedicated to provide a rigorous theoretical background.

ADMISSION TO THE PROGRAM

Applicants for unconditional admission are generally expected to have a core upper-division GPA of 3.0 or higher BSEE or BSCpE degree from an ABET accredited (or equivalent) engineering program and must also satisfy all other university graduate admission requirements in the graduate studies section of this catalog.

Applicants with core upper-division GPAs of 2.7 or more will be considered for conditional admission. All conditional applicants must submit GRE (general) scores prior to admission consideration. Minimum required scores are 650 in the quantitative part, 1100 in (quantitative + verbal) and 3.5 in the analytical writing measure part. Conditions may include but are not limited to minimum academic performance and/or additional coursework. Conditions will vary depending on the MSEE option chosen by the candidate, new conditions may apply if after admission a student decides to switch MSEE option.

Applicants with undergraduate degrees in related disciplines, and those who do not fully satisfy other department or university graduate admission requirements may be considered for possible conditional admission.

Conditionally admitted students must satisfy the specified conditions before being advanced to unconditional standing. Those who do not satisfy these conditions in a timely manner will be dismissed from the program.

REQUIREMENTS

The curriculum for the Master of Science in Electrical Engineering degree requires a minimum of 46 quarter units of coursework, of which at least 33 units must be in 500 and 600 level courses. Each program of study consists of at least 10 units of breadth and emphasis, a maximum of 32 units of electives, and either a Thesis (EGR 696, 4-6 units) or a Master's Degree Project consisting of EGR 691 (2 units) followed by EGR 692 (2 units). Breadth courses are intended to ensure that the student acquires a fundamental knowledge in advanced mathematics. The electives may be chosen from an extensive list of courses in electrical engineering and related areas of mathematics, science, and engineering.

Each of the MSEE Options has different requirements as described below.

Each student must, in consultation with their academic advisor, prepare a program of study that outlines the coursework required to complete the program. This program of study must be prepared when the student has achieved 12-16 units of graduate coursework.

To attain Advancement to Candidacy for the degree, the student must satisfy all of the following:

1. Completion of all conditions of admission, including any preparatory courses that may have been specified,
2. Have an approved program of study on file consistent with one of the MSEE options,
3. Completion 36 quarter units with a grade point average of at least 3.0,
4. Passed the graduation writing test or received a waiver

Please check the Electrical and Computer Engineering Department website for additional information.

CURRICULUM

All students must select one of the following Options:

The Communications and Signal Processing Option covers current communications techniques, signal processing schemes and provides the necessary theoretical basis for their understanding.

The Computer Engineering Option includes hardware system design, algorithms, performability, embedded systems and interfaces to other systems.

The Controls and Robotics Option involves time and frequency domain system design techniques and their applications, real-time systems,and embedded system control.

COMMUNICATIONS AND SIGNAL PROCESSING OPTION

Required Breath and Emphasis (14-16 units)

Stochastic Processes	ECE	543	(4)
Communication Theory	ECE	544	(4)
ECE 500 or 400 Laboratories			(2)
Directed Study and Master's Degree Project	EGR	691/692	(2/2)
or Master's Degree Thesis	EGR	696	(4-6)

Electives (30–32 units)

Option Electives

A minimum of 16 units select from the following list with advisor approval with no more than 4 units of 400 level courses:

Digital Communication Systems	ECE	409	(4)
Microwave Engineering	ECE	410/410L	(3-4)
Digital Signal Processing II	ECE	428	(4)
Optical Fiber Communications	ECE	436	(4)
R.F. Design/Laboratory	ECE	448/448L	(3-4)
Digital Image Processing	ECE	542	(4)
Communication Theory	ECE	544	(4)
Digital Signal Processing	ECE	551	(4)
Wavelet Theory and Applications	ECE	554	(4)

Information Theory and Coding	ECE	560	(4)
Advanced Microwave Engineering	ECE	562	4)
Solid State Devices and Circuits	ECE	563	(4)
Satellite Communication	ECE	586	(4)
Antenna Theory	ECE	589	(4)
Wireless and Digital Communication Lab	ECE	597L	(2)
Special Topics for Graduate Students	ECE	599/599L	(1-4)
Advanced Communication Systems	ECE	644	(4)
Advanced Signal Processing	ECE	651	(4)

Support Electives

A maximum of 12 units select from the following list with advisor approval:

Electromagnetic Fields and Applications	ECE	402	(4)
CMOS Analog Circuits	ECE	407	(4)
Digital Signal Processing/Lab	ECE	408/408L	(4)
Integrated Circuits: Devices and Modeling	ECE	412	(4)
Lasers	ECE	420	(4)
Numerical Modeling	EGR	511	(4)
Matrix Methods in Engineering	EGR	515	(4)
Microelectromechanical Devices and Systems	ECE	530	(4)
Systems Theory	EGR	540	(4)
Solid State Electronics	ECE	548	(4)
Introduction to Neural Networks	ECE	552	(4)
Computer Simulation of Engineering Systems	EGR	553	(4)
Microprocessor Based Control Systems	ECE	555	(4)
Computer Networks	ECE	559	(4)
Digital Integrated Circuit Design in VLSI	ECE	571	(4)
Materials for Electronics	EGR	580	(4)
Biological Control Systems	ECE	588	(4)
Microcontroller Applications Lab	ECE	592L	(2)
DSP Applications Lab	ECE	593L	(2)
FPGA Design Lab	ECE	594L	(2)
Research Methods	EGR	596	(2)
Special Topics for Graduate Students	ECE	599/599L	(1-4)
Systems Theory	ECE	640	(4)
Digital Control Systems	ECE	642	(4)
Optimal Control Systems	ECE	643	(4)
Nonlinear Control Systems	ECE	652	(4)
Appropriate 500/600 Math or CS classes			(3-4)

The allowed maximum transfer units are 13 units of coursework taken at other universities. This maximum includes classes at the 400 or 500 level (not previously used towards a degree) taken at Cal Poly Pomona. No more than 8 units of 599 numbered courses can be used towards the MSEE degree.

COMPUTER ENGINEERING OPTION

Required Breath and Emphasis (14-16 units)

Matrix Methods in Engineering	EGR	515	
or Stochastic Processes	ECE	543	(4)
Computer Organization	ECE	585	(4)
ECE 500 or 400 Laboratories			(2)
Directed Study and Master's Degree Project	EGR	691.692	(2/2)
or Master's Degree Thesis	EGR	696	(4-6)

Electives (32 units maximum)

Option Electives

A minimum of 20 units select from the following list with advisor approval:

Reliability and Performability Analysis	ECE	518	(4)
Network Security	ECE	520	(4)
Object Oriented Approach to Eng. Sftwr Design	ECE	541	(4)
Digital Image Processing	ECE	542	(4)
Digital Signal Processing	ECE	551	(4)
Computer Arithmetic	ECE	558	(4)
Computer Networks	ECE	559	(4)
Advanced Microprocessors	ECE	561	(4)
Digital Signal Testing	ECE	582	(4)
Advanced Computer Organization	ECE	685	(4)

Support Electives

A maximum of 12 units select from the following list with advisor approval:

ECE, CS or MAT 400/500/600	(3-4)

The allowed maximum transfer units are 13 units of coursework taken at other universities. This maximum includes classes at the 400 or 500 level (not previously used towards a degree) taken at Cal Poly Pomona. No more than 8 units of 599 numbered courses can be used towards the MSEE degree.

ROBOTICS AND CONTROL OPTION

Required Breath and Emphasis (20-22 units)

Matrix Methods for Engineering	EGR	515	(4)
Systems Theory	EGR	540	(4)
Stochastic Processes	ECE	543	(4)
Research Methods	EGR	596	(2)
ECE 500 or 400 Laboratories			(2)
Directed Study and Master's Degree Project	EGR	691/692	(2/2)
or Master's Degree Thesis	EGR	696	(4-6)

Electives (24–26 units)

Option Electives

A minimum of 12 units select from the following list with advisor approval:

Differential Equations for Engineers	EGR	509	(4)
Engineering Probability and Statistics	EGR	510	(4)
Numerical Modeling	EGR	511	(4)
Vector Analysis and Complex Variables	EGR	512	(4)
Microelectromechanical Devices and Systems	ECE	530	(4)
Digital Image Processing	ECE	542	(4)
Robust Control	ECE	545	(4)
Microprocessor Based Control Systems	ECE	555	(4)
Special Topics for Graduate Students	ECE	599/599L	(1-4)
Digital Control Systems	ECE	642	(4)
Optimal Control Systems	ECE	643	(4)
Nonlinear Control Systems	ECE	652	(4)

Support Electives

A maximum of 12 units select from the following list with advisor approval:

Digital Signal Processing	ECE	551	(4)
Computer Simulation of Engineering Systems	EGR	553	(4)
Wavelet Theory and Applications	ECE	554	(4)
Biological Control Systems	ECE	588	(4)
Microcontroller Applications Lab	ECE	592L	(4)
DSP Applications Lab	ECE	593L	(4)
Systems Theory	ECE	640	(4)
Advanced Signal Processing	ECE	651	(4)
Appropriate 500/600 Math or CS classes			(3-4)

with no more than 8 units from the following list:

Introduction to Filter Design	ECE	403	(4)
Robotics/Lab	ECE	404/404L	(3-4)
CMOS Analog Circuits	ECE	407	(4)
Digital Signal Processing	ECE	408/408L	(3-4)
Integrated Circuits: Devices and Modelling	ECE	412	(4)
Microprocessor Appl. in Process Control/Lab	ECE	414/414L	(3-4)
Integrated Circuits: Design and Fabrication	ECE	418	(4)
Advanced Control Systems	ECE	419/419L	(3-4)
Biomedical Instr. and Measurements/Lab	ECE	435/435L	(3-4)
Power Electronics/Lab	ECE	469/469L	(3-4)

The allowed maximum transfer units are 13 units of coursework taken at other universities. This maximum includes classes at the 400 or 500 level (not previously used towards a degree) taken at Cal Poly Pomona. No more than 8 units of 599numberred courses can be used towards the MSEE degree.

GRADUATE COURSE DESCRIPTIONS

NOTE: For 400-level and undergraduate prerequisite course descriptions, please see undergraduate section.

ECE 518 Performability Analysis (4)

General concept and advance techniques regarding dependability, performance, and the combined performability analyses. Theoretical background and fault-tolerant design techniques will be discussed. State-of-the-art modeling techniques and analysis tools will be used. 4 lectures/problem-solving.

ECE 520 NETWORK SECURITY (4)

General concepts on network security including cryptography, cryptoanalysis, ciphers, keys, encryption, and hashing. Standards, mathematical backgrounds, programming implementations will be covered. Development tools and analysis tools will be used. 4 lecture/problem-solving. Prerequisites: ECE 315 or equivalent.

ECE 530 Microelectomechanical Devices and Systems (4)

MEMS processes and structures. Applications of basic physical principles to microsystem design. Modeling methods for electromechanical structures. CAD for MEMS. Packaging. Prerequisites: Graduate standing or consent of the instructor. 4 lectures/problem-solving.

ECE 541 Object-oriented Approach to Engineering Software Design (4)

Essential object-oriented programming concepts: encapsulation, inheritance, and polymorphism, GUI development, multimedia software design, application modeling using unified modeling language. 4 lectures/problem-solving. Prerequisite: ECE 304 or equivalent, or consent of instructor.

ECE 542 Digital Image Processing (4)

Basic concepts in digital image processing such as point, algebraic, geometric operations, discrete Fourier transforms, and wavelet transforms, and applications such as image restoration, image compression, and pattern recognition. 4 lectures/problem-solving. Prerequisite: upper division courses in probability theory and digital signal processing.

ECE 543 Stochastic Processes (4)

Analysis of random phenomena associated with the transmission of digital and analog signals. Investigation of random binary signals, thermal noise, signal-to-noise ratios, and Markov processes. Applications include optimum filtering, estimation theory, and queuing theory. 4 lectures/problem-solving. Prerequisite: EGR 510 or equivalent.

ECE 544 Communication Theory (4)

Selected advanced topics in communication systems such as information theory for continuous and discrete channels; signal detection and recognition; coding for optimal communication nets. 4 lectures/problem-solving. Prerequisite: Upper-division course in communications systems.

ECE 545 ROBUST Control (4)

Advanced frequency domain techniques for systems with plant uncertainty and external disturbances. Quantitative Feedback Theory. H2 and H8 design methods. 4 lecture/problem-solving. Prerequisites ECE 309 or equivalent.

ECE 548 Solid State Electronics (4)

Quantum theory and atomic structure. Classical and quantum statistics. Description of crystal structures. Lattice vibrations. Band theory of solids. Transport phenomena in semi-conductors and metals. 4 lectures/problem-solving. Prerequisite: Upper-division course in solid-state electronics.

ECE 551 Digital Signal Processing (4)

Analysis and design of multirate signal processing and its applications. Linear prediction filter design and implementation using FIR and lattice filters. Non-parametric, parametric, and eigensystem algorithms for power spectrum estimation. 4 lectures/problem-solving. Prerequisites: Upper-division courses in Fourier transforms and ECE 428, or equivalent.

ECE 552 Introduction to Neural Networks (4)

Theory and engineering applications of artificial neural networks. 4 lecture/problem solving sessions. Prerequisites: Basis Probability Theory and EGR 515.

ECE 554 Wavelet Theory and Applications (4)

Basic concepts in wavelet theory such as filters, downsampling and upsampling, filter banks, orthogonal filter banks, multiresolution analysis, wavelets, finite length signals, M-channel filter banks, and applications. 4 lectures/problem-solving. Prerequisite: Upper division course in digital signal processing.

ECE 555 Microprocessor-based Control Systems (4)

Typical computer control systems. Supervisory and DDC Control. Mathematics of sample-data control systems. Development of controller algorithms using Z-transforms and microprocessors. On-Line identification techniques, advanced control techniques. Typical microprocessor-based process control systems. 4 lectures/problem-solving. Prerequisites: Upper-division courses in microprocessor and control theory.

ECE 558 Computer Arithmetic (4)

System-level design. VHDL; data flow modeling, structural modeling, algorithmic modeling, and state machine modeling. PLD, CPLD, and FPGA. High speed addition, multiplication and division. Floating-point arithmetic. 4 lectures/problem solving.

ECE 559 Computer Networks (4)

Principles, Protocols, Architecture and Performance Analyses of Local Area Networks, Wide Area Networks, and Internetworking. Asynchronous transfer mode (ATM) networks. 4 lectures/problem solving. Prerequisites: ECE342 and ECE 405 or equivalent.

ECE 560 Information Theory and Coding (4)

Channel models, coding theorems, coding systems, statistical properties of information sources. 4 lectures/problem-solving. Prerequisite: Upper-division course in probability theory.

ECE 561 Advanced Microprocessors (4)

State of the art 32- and 64-bit microprocessors; assembly language and C programming; input/output techniques; system design and peripheral interfacing. 4 lectures/problem-solving. Prerequisite: ECE 432/432L or equivalent.

ECE 562 Advanced Microwave Engineering (4)

Analysis of microwave networks and components, waveguides, and cavities. Design and evaluation of solid state microwave oscillators, mixer circuits, control circuits and phase-shifters. New developments. 4 one-hour lecture/problem solving sessions. Prerequisite: Basic knowledge of electromagnetic theory, transmission line theory, microwave engineering and semiconductor devices.

ECE 563 Solid State Microwave Devices and Circuits (4)

Introduction to parameter matrices and microwave circuit design techniques. Microstrip lines. Design and evaluation of FET amplifiers, FET oscillators. Varactors, mixer diodes, control devices and their microwave circuit applications. Computer-aided design of microwave circuits. New developments. 4 lectures/problem-solving. Prerequisites: Upper-division courses in EM theory and linear active circuits.

ECE 565 RADAR SIGNAL PROCESSING (4)

Introduction to radar systems including monostatic, bistatic and multi-static radar systems. Fundamental systems design concept and resolution limitations. Selected advanced topics of signal processing in radar systems, synthetic aperture radar system, adaptive radar clutter suppression, and super-resolution algorithms. 4 lectures/problem-solving. Prerequisite: ECE 405, ECE 408, or equivalent.

ECE 566 OFDM and CDMA SYSTEMS (4)

Fundamentals of Orthogonal Division Multiplexing (OFDM) and Code Division Multiple Access (CDMA). OFDM generation through the Fast Fourier Transform (FFT). Receiver equation of OFDM signals in double-selective multipath channels. Channel estimation. Channel coding and Turbo processing in OFDM. Multiple-Inpu Multiple-Output (MIMO) OFDM systems. The Spread-Spectrum principle. CDMA systems and their application in 2G and 3G; IS-95, cdma2000. Closed-loop power control and soft handoff for CDMA systems. Capacity of CDMA systems. 4 lectures/problem-solving. Prerequisites: ECE 405 and ECE 405L.

ECE 571 Digital Integrated Circuit Design in VLSI (4)

Analysis and design of LSI and VLSI digital integrated circuits in CMOS technology. Combinational logic circuits. Sequential logis circuits. Static and dynamic operation of logic circuits. Arithmetic building blocks: adder, multiplier, shifter. The influence of parasitic capacitances, inductances, and resistances on the design performance, and approaches to cope with them. Timing issues in digital circuits. Optimizing speed, area, power. Designing memory and array structures. Physical layout design, layout design rule check, circuit extraction and simulation using CAD tools such as L-Edit, MAGIC, and Spice. 4 lectures/problem-solving. Prerequisite: upper division course in semiconductor materials and devices.

ECE 582 Digital System Testing (4)

Basic theories and techniques for testing digital systems. Test generation for combinational and sequential logic circuits. Testing and modeling for faults expected in digital systems. Testing for stuck faults. Design methods to improve system testability. Built-in-self-test (BIST). 4 lecture/discussions.

ECE 585 Computer Organization (4)

Memory Subsystems: Cache, virtual and interleaved memories. Instruction pipelines. Dynamic scheduling algorithms and principles of vector processing. Principles of pipeline processing. Arithmetic and instruction pipeline design. Pipeline scheduling and control. 4 lectures/problem-solving. Prerequisite: Upper division course in computer architecture.

ECE 586 Satellite Communication (4)

Introduction to satellite and wireless digital communication techniques. Link budget analysis. Baseband transmission systems. Power efficiency and spectrally efficient modulation techniques for linear and non-linear satellite channels. Coding for error detection and correction. Synchronization systems. Time division, frequency division, and code division multiple access techniques. Satellite transponders and earth stations. 4 lectures/problem-solving. Prerequisite: ECE 544 or equivalent, or consent of instructor.

ECE 588 Biological Control Systems (4)

Application of control systems analysis to biological control systems. Development of mathematical models of selected biological control systems and the application of computer techniques in simulation of these systems. 4 lectures/problem-solving. Prerequisite: Upper-division course in control systems.

ECE 589 Antenna Theory (4)

Dipole, loop and small antennas, arrays, wire, aperture, lens, horns, reflectors and other special antenna; currents and impedances; radiation and radiation patterns. 4 lectures/problem-solving. Prerequisites: Two upper-division courses in field theory.

ECE 592L Microcontroller Applications Laboratory (2)

Design and performance analysis of microcontroller systems. Experiments will include performance evaluation of design tools and microcontroller hardware. System level design and testing of individual student projects. Prerequisite: ECE 561.

ECE 593L DSP Applications Laboratory (2)

Design and performance analysis of DSP systems. Experiments will include performance evaluation of design tools and DSP hardware. System level design and testing of individual student projects. Prerequisite: Upper division course in digital signal processing.

ECE 594L FPGA Design Laboratory (2)

Modeling digital hardware using Verilog HDL. Implementation of digital hardware using FPGA. 2 lecture/demonstrations. Prerequisite: ECE 585 or equivalent.

ECE 597L Wireless and Digital Communication Laboratory (2)

Design and performance analysis of digital communication systems including FSK, BPSK, QPSK, QAM, GMSK. Experiments will include performance evaluation of RF oscillators, amplifiers, mixers, modulators, transmitters, and digital receivers. Pseudo Noise (PN) codes. PN-coded spread-spectrum BPSK transmitter and receiver. System level testing will include wireless, optical and radar systems. Special experiments on BER and FDMA/TDMA/CDMA will be conducted depending on the

availability of equipment and parts. Prerequisites: ECE 405, ECE 445, ECE 544, and ECE 586.

ECE 640 Systems Theory (4)

Pole-placement design using state-feedback for linear systems, observer (state-estimator) design. Introduction to nonlinear systems and perturbation theory; stability for linear and nonlinear systems using Liapunov methods. 4 seminars. Prerequisite: ECE 540. Unconditional standing required.

ECE 642 Digital Control Systems (4)

Basic theory of sampling, quantizing and modeling of the digital computer for computer controlled feedback systems. State-space and Z-transform representation. Time response stability and design using both classical and modern techniques. 4 seminars. Prerequisites: Upper-division course in control systems and ECE 540. Unconditional standing required.

ECE 643 Optimal Control Systems (4)

Selected topics in optimal control theory such as variational calculus; maximum principle; dynamic programming; state estimation and computational methods in optimal systems control. 4 seminars. Prerequisite: ECE 540. Unconditional standing required.

CE 644 Advanced Communication Systems (4)

Selected advanced topics in communication systems such as spread spectrum systems, computer communications, optical communications and image processing. 4 lecture discussions. Prerequisite: ECE 544 or equivalent. Unconditional standing required.

ECE 651 Advanced Signal Processing (4)

Selected advanced topics in signal processing such as multi-rate signal processing, adaptive filtering, parametric spectrum estimation and signal analysis with higher order spectra. 4 lecture discussions. Prerequisite: ECE 551 or equivalent. Unconditional standing required.

ECE 652 Nonlinear Control Systems (4)

Numerical approximation methods in the solution of non-linear 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. 4 seminars. Prerequisites: upper-division course in control-systems and ECE 540, or consent of instructor. Unconditional standing required.

ECE 685 Advanced Computer Organization (4)

Array processing. Multiprocessor architecture programming and control. Data flow computers and introduction to artificial neural networks. 4 lectures/problem-solving. Prerequisite: ECE 585. Unconditional standing required.

MECHANICAL ENGINEERING

Master of Science in Mechanical Engineering

In the Department of Mechanical Engineering, College of Engineering

www.csupomona.edu/me

Hassan M. Rejali, Chair
Parham Piroozan, Graduate Coordinator

The practice-oriented Master of Science in Mechanical Engineering (MSME) program builds upon an undergraduate education and facilitates more advanced study in one of the branches of mechanical engineering.

MISSION STATEMENT

The Master of Science in Mechanical Engineering (MSME) program is a response to the increasing demand of mechanical engineers in the more advanced and rapidly developing fields such as Computer Aided Design using finite element methods, Computational Thermal and Fluid Sciences and the area of Energy Management. This program allows students to acquire specialized knowledge and research skills for the advanced work in their chosen area of concentration. Also, this program requires a student to complete an engineering project or a thesis that would demonstrate their capability to perform an independent research work. Thus, this requirement instills a great practical value into a student's graduate work at Cal Poly Pomona.

EDUCATIONAL OBJECTIVES

Graduates of the Master of Science in Mechanial Engineering shall have:

- Knowledge of mechanical engineering principles in solid mechanics, mechanical design, dynamics, heat transfer, fluid dynamics, and computational mechanics.
- The ability to conduct engineering analyses and to develop and implement designs and problem solutions.
- An understanding of the various technical and non-technical factors that impact the feasibility and implementation of mechanical engineering projects.
- The foundation needed to develop engineering judgment via professional practice, and to effectively identify, consider and account for multiple and competing objectives.
- The technical knowledge and skills needed to pursue life-long learning, with the ability to independently extend personal knowledge and understanding of engineering topics and practices by conducting literature searches, consulting with others, and using other similar techniques.

ADMISSION TO THE PROGRAM

An applicant for admission to the program or Master of Science in Mechanical Engineering must meet university criteria as specified in the Admission section of this catalog as well as the criteria outlined below. Applicants are advised that a reasonable proficiency in computer programming is necessary for successful completion. If the student is deficient in this area, he or she will be expected to remove the deficiency early in the program.

Successful applicants will be admitted to the program either unconditionally or with conditions imposed on them. To receive unconditional admission, an applicant must satisfy these criteria:

1. The applicant must hold a baccalaureate degree in Mechanical Engineering from a program that has been accredited by the Accreditation Board for Engineering and Technology (ABET) and for which the accreditation was in effect at the time of award of the degree. The degree must have been granted within five years prior to the proposed beginning of the graduate program.
2. The applicant must have achieved a grade point average of at least 3.00 in all undergraduate upper division coursework in mathematics, science and engineering and, additionally, in all coursework attempted with graduate standing.

Conditional admission may be granted in cases in which the applicant' s academic preparation for graduate study is such that criteria 1) and/or 2) above are not satisfied. In such cases, the applicant is required to submit recent test scores of the Graduate Record Examination, letters of recommendation, and other documents attesting to the applicant's aptitude for graduate studies. Applicants who do not satisfy criterion 1) may be required to take a limited number of preparatory courses with no degree credit. When an applicant is admitted conditionally, the conditions to be met and the time allowed for meeting them are stated in the letter of admission. If these conditions are not satisfied, the student may be disqualified from the program.

REQUIREMENTS

A minimum of 45 quarter units (equivalent to 30 semester units) is required for awarding of the Master of Science in Mechanical Engineering degree. The specific requirements are described below. All students must complete either a Master's thesis or a Master's project.

In order to advance to candidacy for the Master of Science in Mechanical Engineering, the student must satisfy all of the following requirements:

1. Completion of all conditions of admission, including any preparatory courses that may have been specified.
2. Have an approved program of study on file.
3. Completion of a minimum of 32 units of coursework with a grade point average of 3.0 or better.
4. Passing the graduation writing test (GWT) or receiving a waiver.

A program of study must be submitted for approval before the end of the second quarter of attendance. At the time of filing of the program of study, the student must opt for publishing a thesis or conducting an independent study and passing a comprehensive examination as a culminating experience of his/her graduate education after completing the required coursework. The thesis effort is intended to involve independent research by the student with the goal of advancing knowledge in a specialized area. The thesis effort includes a defense of the effort by the student before a committee of faculty members. The independent study provides the student an opportunity to explore a practical and realistic industrial problem in his/her chosen field of specialization. The accompanying comprehensive examination is a test of the student's expertise in his/her areas of coursework concentration. Information regarding the thesis and the independent study with a comprehensive examination is available at the Graduate Studies Office.

In addition, each student is responsible for satisfying all university requirements specified elsewhere in the catalog.

CURRICULUM

General requirements for advanced degrees are found in the Graduate Scholastic Requirements section of this catalog. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on the program of study. No more than 13 units of

acceptable graduate credit may be petitioned by an undergraduate student. A total of 13 transfer, Extended University, or units petitioned for graduate credit, or any combination of 13 units, may be included on the program of study.

The curriculum for the Master of Science in Mechanical Engineering requires a minimum of 45 units of coursework, of which at least 36 units must be in 500 and 600 level courses. Each program of study consists of at least 12 units of breadth courses, at least 12 units of technical emphasis courses, at least 12 units of elective courses, and either EGR 696, thesis (4-9 units) or EGR 692, independent study with a comprehensive examination (4 units). The breadth courses must be chosen from the sequence EGR 509 through 515. These courses are intended to insure that the student acquires a fundamental knowledge in advanced mathematics. A minimum of 12 units of technical emphasis courses must be selected from an approved course list for the MSME program. No 400-level course may be included in this category of technical emphasis, and a maximum of 4 transfer units can be used to satisfy the 12 unit requirement. The rest of the emphasis courses and electives may be chosen from an extensive list of courses in engineering and related areas of mathematics and sciences. They should be chosen in collaboration with an advisor to insure consistency with graduate goals and to assure an integrated educational experience. A course in the program of study may be taken only after the student has satisfied the course prerequisites for enrolling in the course. It is the student's responsibility to satisfy all prerequisites for a course before enrolling in the course.

Engineering graduate students may be granted graduate credit only for courses numbered 400 and above. A grade point average of 3.0 (B) or better must be maintained in all upper-division and all graduate courses. Candidates must be enrolled in the university during the quarter of graduation

Breadth Courses (12 units minimum)

Adv. Differential Equations	EGR	509	(4)
Engr. Prob. and Statistics	EGR	510	(4)
Numerical Modeling	EGR	511	(4)
Vector Analysis and Complex Variables	EGR	512	(4)
Engineering Tensor Analysis	EGR	513	(4)
Variational Methods in Engineering	EGR	514	(4)
Matrix Methods in Engr	EGR	515	(4)

Technical Emphasis (12 units minimum)

Select from the following list:

Elasticity	ME	520	(4)
Conduction Heat Transfer	ME	532	(4)
Mechanical Metallurgy	ME	533	(4)
Advanced Fluid Dynamics	ME	535	(4)
Advanced Classical Dynamics	ME	536	(4)
Advanced Engineering Thermodynamics	ME	545	(4)
Advanced Mechanics of Materials	ME	556	(4)
Radiation Heat Transfer	ME	564	(4)
Convective Heat Transfer	ME	584	(4)

Technical Electives (12–16 units)

Select from the following list:

Fracture of Solids	ME	534	(4)
Advanced Transport Phenomena	ME	550	(4)
Analysis of Mechanical Designs	ME	557	(4)
Nonlinear Dynamics	ME	570	(4)
Combustion Theory	ME	576	(4)
Solar Energy Systems	ME	590	(4)
Direct Energy Conversion	ME	591	(4)
Computational Fluid Dynamics	ME	632	(4)
Special Topics	ME	599	(4)

Elective courses may include up to 8 units of approved 400-level courses that are relevant to the program of study, so long as these or equivalent courses have not already been used for credit toward an undergraduate degree.

Thesis or Independent Study Exam			(2 units)
Ind. Study with Comp. Exam	EGR	692	(2)
Master's Degree Thesis	EGR	696	(2)
Master's Degree Continuation	EGR	699	(2)

GRADUATE COURSE DESCRIPTIONS

NOTE: For undergraduate prerequisite course descriptions, please see undergraduate section.

ME 520 Elasticity (4)

Theory of stress and strain for continuous media. Stress-strain relations of elasticity. Plane stress and strain. Introduction to thermoelasticity. 4 lectures/problem-solving. Prerequisites: Upper-division courses in structural analysis and EGR 513, or consent of the instructor.

ME 532 Conduction Heat Transfer (4)

Application of principles of heat transfer and thermodynamics in solution of steady-state and transient heat transfer problems. Classical heat conduction theory. Derivation of Fourier equation and integration of various single and multidimensional problems. Detailed discussion of thermal conductivity. 4 lectures/problem-solving. Prerequisite: Upper-division course in heat transfer.

ME 533 Mechanical Metallurgy (4)

Study of the mechanical behavior of metals. Fundamental mechanisms controlling deformation phenomena, strain-hardening, creep, fatigue, and fracture. Strengthening mechanisms involving alloying and heat treatment. 4 lectures/problem-solving. Prerequisites: Undergraduate courses in strength of materials and materials science.

ME 534 Fracture of Solids (4)

Engineering and microscopic approaches, fracture of steels, creep and fatigue, stress corrosion cracking, and hydrogen embrittlement. 4 lectures/problem-solving. Prerequisite: Upper-division course in stress analysis.

ME 535 Advanced Fluid Dynamics (4)

Governing field laws: mass, momentum, energy. Reynolds' Transport Theorem: mass, momentum, energy. Cartesian tensor notation. Rotation, stress, rate-of-strain relations. Flow kinematics. Ideal fluid flow. Conformal transformations. Viscous flows: pipe, flat plate. 4 lectures/problem-solving. Prerequisite: Upper-division course in fluid mechanics or consent of instructor.

ME 536 Advanced Classical Dynamics (4)

Lagrange's equations, Hamilton's principle, variational principles, equations of motion in Eulerian angle systems, characteristic equation of inertia matrix, cuspidal motion and nutation. 4 lectures/problem-solving. Prerequisites: EGR 515 and upper-division course in dynamics, or consent of instructor.

ME 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. 4 lectures/problem-solving. Prerequisite: Upper-division course in thermodynamics.

ME 550 Advanced Transport Phenomena (4)

Differential balances for momentum, heat, and mass transfer. 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. 4 lectures/problem-solving. Prerequisites: Upper-division courses in heat transfer and fluid mechanics.

ME 556 Advanced Mechanics of Materials (4)

Stress and strain analysis, 2-D elasticity problems, unsymmetrical bending, shear center, torsion of prismatic members, inelastic and plastic behavior in torsion and bending, topics from: micro-mechanics of composite materials, energy methods, failure theories, theory of plates, thick walled pressure vessels. 4 lectures/problem-solving. Prerequisite: Upper-division course in stress analysis.

ME 557 Analysis of Mechanical Designs (4)

Analysis of common machine elements. Relation to design decision making. Optimization, reliability, miniaturization, and statistical strength theory. 4 lectures/problem-solving. Prerequisite: Upper-division course in stress analysis.

ME 564 Radiation Heat Transfer (4)

Radiation properties of surfaces; radiant interchange among surfaces separated by radiatively non-participating media including the interchange among black and gray surfaces; radiant energy transfer through absorbing, emitting, and scattering media. 4 lectures/problem-solving. Prerequisite: Undergraduate course in heat transfer.

ME 570 Nonlinear Dynamics (4)

Complementary methods of nonlinear modeling of physical, chemical and fluid systems. Analytic, topologic and computational perspectives. Dimensions and fractals. Bifurcations and catastrophes. Deterministic chaos. Solitons. Applications to ecology, hydrodynamics, electrical and mechanical systems. 4 lectures/problem-solving. Prerequisite: EGR 536 or consent of the instructor.

ME 576 Combustion Theory (4)

Molecular structure and statistical thermodynamics. Real gases. Transport phenomena. Chemical reactions in gases. Reactive gas dynamics. Combustion phenomena and diffusion flames. Premixed gas flames; flame propagation, cellular flames, quenching. Aerodynamics of flames; flame shape, turbulent flames. Detonation. Applications. 4 lectures/problem-solving. Prerequisites: Undergraduate courses in thermodynamics and heat transfer.

ME 584 Convective Heat Transfer (4)

Conservation principles. Fluid stresses and flux laws. Laminar and turbulent boundary layers. Internal flow; noncircular cross sections, entry lengths, asymmetric heating. External flow; variable velocity, injection, specified temperature and heat flux distribution. Temperature dependent fluid properties. Computer solutions. 4 lectures/problem-solving. Prerequisite: Undergraduate course in heat transfer.

ME 590 Solar Energy Systems (4)

Analysis of advanced, hybrid solar collectors. Advanced solar energy storage. Design of solar energy systems. 4 lectures/problem-solving. Prerequisite: Upper-division course on solar energy or equivalent.

ME 591 Direct Energy Conversion (4)

Conversion of primary chemical, nuclear, solar and heat energy directly to electrical energy without intermediate mechanical elements. Fuel cells, solar cells, magnetohydrodynamic generators, and fusion plasma generators. 4 lectures/problem-solving. Prerequisite: Upper-division course in thermodynamics.

ME 632 Computational Fluid Dynamics (4)

Fundamentals of finite-difference methods: partial differential equations, difference representation, stability, errors. Dynamics of a body moving through a fluid medium. Inviscid fluid flows. Compressible fluid flows. Viscous fluid flows. Secondary flows and flow instabilities. Panel methods. 4 lectures/problem-solving. Prerequisites: EGR 509 and ME 535, or ARO 301, or equivalent. Unconditional standing required.

ENGINEERING MANAGEMENT

Master of Science in Engineering Management

In the Department of Industrial and Manufacturing Engineering, College of Engineering

www.csupomona.edu/ime

Abdul B. Sadat, Chair and Graduate Coordinator

The Master of Science in Engineering Management is a unique program developed to meet industry need for highly qualified and well trained engineering managers. The program gives engineers advanced multidisciplinary training in manufacturing, production and operations management, business, and finance. It is such an interdisciplinary program to be offered by the College of Engineering in cooperation with the College of Business Administration. Most of the applicants to the program are expected to have work experience, to be working full-time, and to enroll as part-time students. The curriculum is structured so that the student can complete a course of study tailored to the student's unique talents and career goals. It culminates in an engineering management research experience that addresses students and industry needs. Students will be given the option of performing thesis research on individual topics or to join research teams sponsored by one of the programs' industry partners.

ADMISSION TO THE PROGRAM

All applicants for the Masters in Engineering Management must file an admission application on line at www.csumentor.edu. To receive unconditional admission to the MSEM program applicants must hold a baccalaureate degree in engineering, or engineering technology (Applicants holding engineering technology degrees may be required to take the GRE Test and/or some preparatory courses with no graduate credit) from an ABET-accredited program. In addition, the applicant must have attained a grade point average of at least 3.0 in all undergraduate upper division mathematics, science and engineering courses, and, likewise in all courses attempted with graduate standing. Conditional admission may be granted in cases in which the applicant does not satisfy the criteria for unconditional admission, but can demonstrate aptitude for graduate study by submitting test scores of the Graduate Record Examination, letters of recommendation and other relevant documents. A minimum GRE score of 1100 in the Quantitative and Verbal sections of the exam is required for admission to the program.

All applicants from foreign countries should contact the Office of Admissions at least one year in advance of application so that all required materials may be supplied in time for evaluation. Applicants whose native language is not English must submit the results of the Test of English as a Foreign Language (TOEFL) prior to admission.

PROGRAM REQUIREMENT

A minimum of 48 quarter units of course work is needed. This should include at least 24 units of graduate business administration (GBA) courses, and a minimum of 24 quarter units of engineering graduate (EGR) courses. A maximum of 8 quarter units at the 400 level may be accepted for graduate EGR or GBA courses. The program of study includes at least 16 quarter units of breadth courses and 20 quarter units of technical emphasis courses. The remaining units consist of at least 6 quarter units of electives, and an Independent Study with a Report. A grade point average of 3.0 or better must be maintained. During the first quarter each student will develop a program of study approved by Graduate Studies Committee. A total of 13 quarter units of transfer, Extended University or units petitioned for graduate study, or any combination of 13 units may be included in a Master's contract. The stipulated time limit of 7 years applies to all of the above.

Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is granted upon the recommendation of the graduate faculty and implies a readiness to attempt the thesis or independent study. Students who are not candidates are not eligible to register for EGR 691, 692, 696 or 699. In order to advance to candidacy the student must:

1. Satisfy all admissions conditions, if any.
2. Have an approved program of study
3. Complete at least 48 units of graduate coursework with a grade point average of 3.0 or better; and
4. Satisfy the Graduation Writing Test.

CURRICULUM

A minimum of 48 quarter units is required for the Master of Science in Engineering Management (MSEM) program. This should include at least 24 quarter units of engineering graduate (EGR) courses and a minimum of 24 units of graduate business administration (GBA) courses.

Core (20 units)

Select 5 from the following list:

Advanced Engineering Economics or	EGR	538	(4)
Advanced Human Factors	EGR	539	(4)
Advanced Methods in Operations Research	EGR	549	(4)
Total Quality Management in Engineering	EGR	572	(4)
Adv Operations Planning and Control Systems	EGR	573	(4)
Advanced Facility Planning	EGR	574	(4)

Take all from the following list:

Financial Accounting	GBA	510	(4)
or Managerial Accounting for Decision Making	GBA	608	(3)
and Directed Study in Managerial Accounting	GBA	609	(1)
Managerial Statistics	GBA	514	(4)
Fundamentals of Financial Management	GBA	546	(4)
Project Management	GBA	636/637	(3/1)
Management Policies and Strategies	GBA	687/688	(3/1)

Electives (4–6 units minimum)

Select from the following list:

Research Methods	EGR	596	(2)
Directed Study	EGR	691	(2)
Essential of Marketing Management	GBA	517	(4)
Legal Environment of Business	GBA	530	(4)
Analysis of Federal Contracts	GBA	552	(4)
Personnel Management	GBA	562	(4)
Seminars in Organizational Behavior	GBA	615/616	(3/1)

Terminal Options

Choose Option I or II

Option I

Master's Degree Project	EGR	692	(2)

Option II

Master's Degree Thesis	EGR	696	(4-8)

COLLEGE OF ENVIRONMENTAL DESIGN

www.csupomona.edu/~env

Michael Woo, Dean
Sarah Meyer, Interim Associate Dean

The College of Environmental Design offers four Masters degree programs, including Master of Architecture, Master of Landscape Architecture, Master of Urban and Regional Planning and Master of Science in Regenerative Studies. Discipline-based national accreditation boards accredit the first three programs; there is no discipline-based accreditation board for Regenerative Studies. All four programs are open to applicants who do not have prior professional or academic experience in these disciplines. Our Masters programs combine theory and practical experience, preparing students to go on for Doctoral-level work or to enter the workforce. Classes typically are small (under 20 students) and are taught by faculty rather than by graduate assistants. Faculty members often incorporate real-world examples and projects into their classes. The Masters of Urban and Regional Planning program is primarily a late afternoon/evening program, so that students can continue to work during the day while they earn their professional degree.

As of fall 2007, all undergraduate and graduate students entering College of Environmental Design majors are required to purchase a computer that meets departmental specifications. All applicants are invited to check with their department office or go to the department's website to obtain these specifications. Financial assistance for this computer purchase is available to students qualifying for Federal Student Aid (requested via the FAFSA application). Please contact the University's Office of Financial Aid (909-869-3700) for additional information.

MASTER OF ARCHITECTURE

Judith Sheine, Chair
Kip Dickson, Graduate Coordinator

MASTER OF LANDSCAPE ARCHITECTURE

Gerald O. Taylor, Chair and Graduate Coordinator

MASTER OF SCIENCE IN REGENERATIVE STUDIES

Kyle D. Brown, Director, John T. Lyle Center
Denise Lawrence, Graduate Coordinator

MASTER OF URBAN AND REGIONAL PLANNING

Jerry V. Mitchell, Chair
Herschel Farberow, Graduate Coordinator

ARCHITECTURE

MASTER OF ARCHITECTURE

In the Department of Architecture, College of Environmental Design
www.csupomona.edu/~arc

Judith Sheine, Chair
Kip Dickson, Graduate Coordinator

The Department of Architecture offers programs of study which lead to the degree, Master of Architecture.

The Master of Architecture as a first professional degree (M. ARCH I) is accredited by the National Architecture Accrediting Board. In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted a 6-year, 3-year, or 2-year term of accreditation, depending on the extent of its conformance with established educational standards.

Master's degree programs may consist of a preprofessional undergraduate degree and a professional graduate degree that, when earned sequentially, constitute an accredited professional education. However, the preprofessional degree is not, by itself, recognized as an accredited degree.

As of fall 2007, all undergraduate and graduate students entering the College of Environmental Design majors are required to purchase a computer that meets departmental specifications. All applicants are invited to check with their department office or go to the department's website to obtain these specifications. Financial aid assistance for this computer purchase is available to students qualifying for Federal Student Aid (requested via the FAFSA application). Please contact the University's Office of Financial Aid (909-869-3700) for additional information.

The M. ARCH I program accepts students from varied academic backgrounds, including non-design disciplines, for a three year and one quarter program. For students with no previous study in architecture, two years of intensive prerequisite course work precedes the final four quarters of the Master of Architecture program. Students must complete courses in college algebra, trigonometry, and physics prior to beginning this program since these courses are prerequisites to the study of design studios, structures and environmental controls. Failure to take these courses in advance may lengthen the program by as much as two quarters.

Students holding a non-professional bachelor of arts or bachelor of science degree, with a major in architecture, are encouraged to apply for advanced standing within the M. ARCH I graduate program. Normally, two years and one quarter of additional study in this advanced standing program would lead to the Master of Architecture degree. The final four quarters of the M. ARCH I program require 60 quarter units of academic work.

Students in the M.Arch. I program may select one of two concentrations: Historic Preservation or Sustainability. In addition to offering specialized courses, faculty conduct research in which graduate students may participate. The programs are enhanced by university-owned facilities including the Richard and Dion Neutra VDL Research House, the Lyle Center for Regenerative Studies, the ENV Archives-Special Collections and the Visual Resources Library.

Prior to graduation, all students in the M. ARCH I program are required to fulfill 500 hours of work. A minimum of 250 hours of work must be with a registered architect. The remaining 250 hours may be completed with a faculty-approved alternative. This work must be verified by the department's Coordinator of Professional Practice and Cooperative Education.

The M. ARCH II program a post-professional degree, provides advanced study for students already holding the Bachelor of Architecture degree. The program is best suited to students whose undergraduate work in architecture, or whose subsequent professional work, demonstrates the intelligence, curiosity, self-discipline and creativity necessary for graduate work. A minimum of 60 quarter units of academic work, including a culmination thesis/project, must be completed in this program before the Master of Architecture degree is granted.

ADMISSION TO THE PROGRAM

For admission to the Master of Architecture program, an applicant must have received a baccalaureate degree and have attained an overall undergraduate grade point average of at least 3.0. An applicant who does not meet these criteria may be admitted on a conditional basis if evidence of compensating qualifications can be furnished. Students may enter the Master of Architecture program in the fall quarter only.

In addition to the standard university application forms and official transcripts of all college work which must be submitted to the university Admissions Office, the Department of Architecture requires the following:

1. Portfolio (BOUND 8 1/2" X 11") illustrating creative ability in graphic form;
2. Statement of purpose or intentions in applying to the program; and
3. Three letters of recommendation from those in a position to assess the applicant's potential for either the profession of architecture or a master's level academic program.

Personal interviews are not required. The Graduate Record Examination (GRE) is recommended but is not required. Additional materials, beyond those required, may be submitted.

Applicants should contact the Department of Architecture for the critical dates in the admission process. January 15 is the usual deadline for application materials. Applicants will be notified of the decision of the departmental admissions committee by April 15 or as soon thereafter as possible.

Upon admission to the Department of Architecture, the student will meet with the coordinator of the graduate program to prepare a reasonable sequence of course work. The curriculum thus specified may be altered only by written request submitted in accordance with university regulations.

REQUIREMENTS AND CONDITIONS

1. In the Master of Architecture, First Professional Degree program (M. Arch I), as many as 160 quarter units may be required. For the Master of Architecture Second Professional Degree Program (M.Arch II), a minimum of 60 quarter units must be completed. In this program, no more than 24 units of 400-level work will be accepted. No work below 300-level will be accepted in either program.
2. All course work must be completed in residency, unless consent is granted by the Graduate Studies Committee for each off-campus course. Title 5 of the California Code of Regulations requires a

minimum of 32 units of coursework in residence.

3. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a master's contract. No more than 13 units of acceptable undergraduate credit may be petitioned by a graduate student. A total limit of 13 transfer, or Extended University, or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.
4. An overall average of "B" (3.0) or better must be maintained in order to receive a graduate degree. The minimum grade in architecture courses which will be accepted for credit toward the degree is "C." Any course in which a lower grade is received must be retaken, but the initial grade will not be removed from the student's record nor from the calculations for the grade point average.
5. A student must be enrolled in a minimum of 6 and a maximum of 18 quarter units of work per quarter. In order to take more than 18 units per quarter, the student must obtain prior approval of the Graduate Coordinator and file a petition in the Records Office.
6. Advancement to Candidacy must be achieved. The Graduation Writing Test (GWT) must be passed prior to advancement.
7. A final project/thesis is required of candidates in both the First (M. ARCH I) and Second (M. ARCH II) Professional Degree programs. The candidate must submit a written proposal and file a petition outlining the goals, procedures and intentions of his/her independent project, and receive approval for it from the department's Graduate Studies Committee prior to enrolling in the project course.
8. Credit will not be awarded for the same course in both the baccalaureate and master's programs in architecture.
9. All class work becomes the property of the department with superior work retained for display and archival use.
10. The candidate must be enrolled in the university during the quarter of graduation.

PROGRAM FOR THE MASTER OF ARCHITECTURE I

First Professional Degree

PREREQUISITE COURSES

Normally already met by students who hold the Bachelor of Architecture Degree

Structures	ARC	321/321A	(3/1)
Structures	ARC	322/322A	(3/1)
Structures	ARC	323/323A	(3/1)
Environmental Controls	ARC	331/331A	(3/1)
Environmental Controls	ARC	332/332A	(3/1)
Building Construction	ARC	341/341A	(3/1)
Building Construction	ARC	342/342A	(3/1)
Ancient and Medieval Architecture	ARC	361/361A	(3/1)
Renaissance and Baroque Architecture	ARC	362/362A	(3/1)
Modern Architecture Since 1750	ARC	363/363A	(3/1)
Digital Design Media in Architecture	ARC	450	(4)
Architectural Practice	ARC	471/471A	(3/1)
Behavioral Factors in Architecture	ARC	481	(4)
Introduction to Architectural Design	ARC	501/501L	(3/3)
Introduction to Architectural Design	ARC	502/502L	(3/3)
Intermediate Architectural Design	ARC	503/503L	(3/3)
Architectural Design	ARC	504/504L	(3/3)
Architectural Design	ARC	505/505L	(3/3)
Architectural Design	ARC	506/506L	(3/3)
Building Codes	ARC	592	(2)
Introduction to Digital Media	ARC	591	(2)
Approved Electives			(8)

TOTAL PREREQUISITE UNITS . . . . . (100)

FINAL FOUR QUARTER PROGRAM

Seismic Design	ARC	424/424A	(4)
American Architecture	ARC	464/464A	(3/1)
Advanced Architectural Design	ARC	601/601L	(3/3)
Advanced Architectural Design	ARC	602/602L	(3/3)
Social Responsibility in Architecture	ARC	652	(4)
or Theory and Literature of Architecture	ARC	653	
Project/Thesis Research	ARC	691	(4)
Project/Thesis Programming	ARC	694	(4)
Master's Project	ARC	695	(8)
or Master's Thesis	ARC	696	

Select two courses from two different departments LA/RS/URP . . . . . (6-8)
Professional Electives . . . . . (12-14)

TOTAL FOUR QUARTER PROGRAM . . . . . (60)
TOTAL UNITS FOR MASTER OF ARCHITECTURE I . . . . . (160)

PROGRAM FOR THE MASTER OF ARCHITECTURE II

Second Professional Degree

Project/Thesis Research	ARC	691	(4)
Project/Thesis Programming	ARC	694	(4)
Master's Project	ARC	695	(8)
or Master's Thesis	ARC	696	

Professional Electives (must be arranged with prior approval of Graduate Coordinator) . . . . . (44)

TOTAL UNITS FOR MASTER OF ARCHITECTURE II . . . . . (60)

PROFESSIONAL ELECTIVE COURSES

Energy Conservation	ARC	333	(4)
Asian Architecture	ARC	366	(4)
Advanced Structures	ARC	425	(4)
Advanced Structures	ARC	426	(4)
Sustainable Technology	ARC	431	(4)
Solar Design	ARC	432	(4)
Advanced Digital Design Media	ARC	452	(4)
Architecture and Urbanism	ARC	463	(4)
Contemporary Architecture	ARC	465	(4)
California Architecture	ARC	467	(4)
Latin American Architecture	ARC	468	(4)
Topics in So. California Architecture	ARC	469	(4)
The Architect and the Development Process	ARC	473	(4)
Business Development in Architecture	ARC	476	(4)
Behavioral Factors in Architecture	ARC	482,483	(4,4)
Topics in Design History	ARC	567	(4)
Directed Study	ARC	591	(2-4)
Directed Study	ARC	592	(2-8)

Other electives must receive prior approval of the Graduate Coordinator.

GRADUATE COURSE DESCRIPTIONS

NOTE: For graduate prerequisite course descriptions, see undergraduate section.

ARC 501/501L Introduction to Architectural Design (3/3)

Introduction to the fundamental elements of architectural design explored in the abstract. The principles and techniques equip the student for an exploration of real human problems. Emphasis on basic design, graphic communication skills and model-making. For Master of Architecture students only. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisite: graduate student in architecture.

ARC 502/502L Introduction to Architectural Design (3/3)

A study of general aspects of ecological, human, aesthetic and technological factors as architectural design determinants. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisites: graduate student in architecture, and ARC 501/501L.

ARC 503/503L Intermediate Architectural Design (3/3)

Procedures and methods related to architectural design application. Emphasis on program development and sustainability, including design detailing. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisites: graduate student in architecture, and ARC 502/502L.

ARC 504/504L Architectural Design (3/3)

An investigation of materials as well as methods of structure and construction as they become the determinants of design theory. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisites: graduate student in architecture, ARC 503/503L, ARC 341.

ARC 505/505L Architectural Design (3/3)

The design of complex buildings with an emphasis on the inclusion of structural, mechanical, environmental and energy-conserving systems. 3 lecture discussions; 3 three-hour laboratories. Concurrent enrollment required. Prerequisites: graduate student in architecture, and ARC 504/504L.

ARC 506/506L Architectural Design (3/3)

Design of complexes of buildings, with an emphasis on conceptual issues and issues of context. (May be repeated once as an addition to the course of study). 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisites: graduate student in architecture, and ARC 505/505L.

ARC 567 Topics in Design History (4)

Non-chronological investigations of the elements, typologies, methods and context of architecture; comparisons of historic and contemporary designs. 2 two-hour lecture discussions. Prerequisites: graduate student in architecture, and ARC 363/363A or ARC 464/464A.

ARC 591 Directed Study (2–4)

Directed study on a subject of interest to the student and important to the understanding of architecture. Prerequisite: prior approval of the proposal by the Graduate Studies Committee. This course may be repeated once for credit. Prerequisite: graduate student in architecture.

ARC 592 Directed Study (2–8)

Directed study on a subject of interest to the student and important to the understanding of architecture. Prerequisite: prior approval of the proposal by the Graduate Studies Committee. This course may be repeated once for credit. Prerequisite: graduate student in architecture.

ARC 601/601L Advanced Architectural Design (3/3)

Advanced study of interaction of design methods, user needs, and site constraints explored in design projects. 3 lecture discussions; 3 three-hour laboratories. Concurrent enrollment required. Prerequisite: graduate student in architecture.

ARC 602/602L Advanced Architectural Design (3/3)

An exploration of urban design issues, including research and analysis of the topics associated with mixed use projects. 3 lectures, 3 three-hour laboratories. Concurrent enrollment required. Prerequisites: graduate student in architecture, and ARC 601/601L.

ARC 652 Social Responsibility in Architecture (4)

Examination of the social context of buildings and architecture, beyond the limited functional and economic needs of clients; the implicit responsibility of buildings and architects to broaden environmental issues, as well as social needs. 2 two-hour seminars. Prerequisite: graduate student in architecture.

ARC 653 Theory and Literature of Architecture (4)

Explorations into the polemics, methodologies, and ideals of architecture through a review of its literature; emphasis on texts significant to contemporary practice. 2 two-hour seminars. Prerequisite: graduate student in architecture.

ARC 691 Project/Thesis Research (4)

Identification, supporting research, and development of master's project/thesis proposal. 1 four-hour seminar. Prerequisites: graduate student in architecture, and ARC 601/601L.

ARC 694 Thesis/Project Programming (4)

Research and programming in support of faculty-approved student's master's project/thesis. 1 four-hour seminar. Prerequisites: graduate student in architecture, ARC 601/601L, and ARC 691.

ARC 695 Master's Degree Project (8)

Independent and complete design project derived from the work developed in ARC 691 and 694; design development and presentation. Prerequisites: graduate student in architecture, and ARC 694.

ARC 696 Master's Degree Thesis (8)

Independent written thesis project derived from the work of ARC 691 and 694 culminating in a formal presentation and defense. Prerequisites: graduate student in architecture, and ARC 694.

ARC 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Approval of department graduate program coordinator is required to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis. Prerequisite: graduate student in architecture.

LANDSCAPE ARCHITECTURE

MASTER OF LANDSCAPE ARCHITECTURE

In the Department of Landscape Architecture, College of Environmental Design
www.csupomona.edu/~la

Gerald O. Taylor, Chair

Landscape Architecture Graduate Studies Committee:
Gerald O. Taylor, Chair and Graduate Coordinator

Weimin Li Andrew O. Wilcox
Susan Mulley
Philip N. Pregill

The Department of Landscape Architecture welcomes graduate students from a variety of academic disciplines who are concerned with the shaping of our physical environment. Students learn current and advanced methods for establishing strong, well-defined, and mutually life-sustaining and enhancing relationships between people and the land. The curriculum emphasizes case study projects at scales varying from the garden to the region with frequent review, discussion, and seminar sessions.

Students with degrees in non-design disciplines take a series of preparatory courses designed specifically to meet their needs. The preparatory courses, which begin in summer quarter, will normally require four quarters of study before the student proceeds with regular graduate courses. Completion of the degree program requires six quarters in residence for students with bachelor's degrees in landscape architecture or architecture. Students seeking a first professional design degree will have ten quarters in residence for completion of degree requirements.

The Department of Landscape Architecture considers its location in southern California to be of special advantage for the study of landscape and environment. The presence of sea coast, mountain and desert terrain as well as one of the major metropolitan centers in North America offers a unique opportunity for professional study. Project sites may range throughout the southern area of California and field trips to a variety of areas and locations throughout the state are a regular aspect of the graduate program. Applicants to the program should anticipate frequent field trips as an essential part of their studies. Students may also participate in programs at the Center for Regenerative Studies, an interdisciplinary laboratory for sustainable living, located on campus.

As of fall 2007, all undergraduate and graduate students entering College of Environmental Design majors are required to purchase a computer that meets departmental specifications. All applicants are invited to check with their department office or go to the department's website to obtain these specifications. Financial aid assistance for this computer purchase is available to students qualifying for Federal Student Aid (requested via the FAFSA application). Please contact the University's Office of Financial Aid (909-869-3700) for additional information.

The objectives of the graduate program encompass both a general professional educational background and advanced specialized study. Upon completion of the degree requirements the graduate should have developed:

1. An advanced level of professional expertise in ecosystematic land planning, that is, in shaping and controlling land in conformance to and in harmony with the processes of natural ecosystems (LA 512/512L, 602/602L, 606/606L).
2. A basic competence in the major skills of landscape architecture and be able to function productively, though probably not yet independently, in professional practice. These skills and the courses in which they are emphasized are: (a) Plants and planting design (LA 540/540L, 541/541L) (b) Landscape construction and technology (LA 531/531L, 532/532L, 565/565L, 632/632L) (c) Project design and site planning (LA 510/510L, 512/512L) (d) Environmental analysis and impact prediction (LA 604/604L).
3. An ability to make a creative and original contribution to some particular area of landscape architecture, either theoretical or practical, according to personal interest (LA 576, 601, 652, 692, 695, 696).
4. A comprehension of the literature, history, and theory of landscape architecture sufficient to communicate the concepts of the profession to others and to use as a philosophical basis for individual professional work (acquired primarily through LA 322/322L, LA 423/423L, LA 424/424L, LA 521/521L, LA 552).

ADMISSION TO THE PROGRAM

Admission to the Master of Landscape Architecture program requires an undergraduate grade point average of 3.0 (B) or better. An applicant with an average between 2.5 and 3.0 will be considered for admission if other qualifications can be demonstrated.

Admission as an unconditional graduate student requires a professional design degree (such as landscape architecture or architecture). Applicants with degrees in other disciplines are admitted as conditional graduate students. The conditions of admission are described in the section on "Curricular Requirements."

Applications are accepted from students with degrees in all disciplines. Applicants who have developed skills and knowledge in areas directly applicable in landscape architecture, such as ecology, geography, or fine arts, may be given priority in selection.

In addition to the standard university application forms and official transcripts which must be submitted to the university Admissions Office, the Department of Landscape Architecture requires supplementary materials as noted:

1. Statement of intent addressing interest in advanced study in Landscape Architecture
2. Two letters of recommendation
3. Portfolio of design work or an example of scholarly writing
4. Graduate Record Exam scores

January 15 is the usual deadline for application with support materials due February 15, however applicants should contact the Department of Landscape Architecture and the University Admissions Office for the critical dates in the admission process.

PROGRAM REQUIREMENTS

Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is granted a student upon the recommendation of the graduate faculty and implies a readiness to attempt the project or thesis. Students who are not candidates are not eligible to register for LA 695 or 696.

In order to advance to candidacy for the Master of Landscape Architecture the student must: (1) satisfy all admissions conditions, if

any; (2) satisfy the Graduation Writing Test; and (3) with the graduate advisor, develop and file a program of study and have it approved by the Graduate Studies Analyst, and by the graduate coordinator for Landscape Architecture. The curriculum specified in the program may be altered only by written petition, which shall be submitted in accordance with university regulations.

CURRICULAR REQUIREMENTS

1. A minimum of 72 quarter units of graduate work must be completed in the graduate degree program. Prerequisite courses are in addition to this minimum. Upper division courses in elective and minor emphasis areas must be approved by the student's advisor. 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. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.
3. The following courses are required for all graduate students in landscape architecture: LA 512/512L, LA 601, LA 602/602L, LA 604/604L, LA 606/606L (18 units), LA 632/632L, LA 652 or LA 694, and LA 695 or 696. Students with a degree in landscape architecture have the option of including LA 540/540L to satisfy degree requirements if it is their preference.
4. In addition to the above, the following courses are required for first professional design degree students: one of the following three courses in history: LA 322/322L, LA 423/423L or LA 424; LA 509/509L; LA 510/510L; LA 511/511L; LA 521/521L; LA 531/531L; LA 532/532L; LA 540/540L; and LA 541/541L. Additional courses may be required for students without adequate preparation for graduate study in landscape architecture.
5. Each student must also select either the project or thesis track to fulfill their terminal requirement as follows:

   A. Project Track: LA 652 (4 units), LA 695

   B. Thesis Track: LA 694 (4 units), LA 696
6. Additional elective content is required to satisfy the minimum unit requirements for the Master of Landscape Architecture degree. Courses may be selected from offerings in the College of Environmental Design as well as other colleges.
7. The candidate must be enrolled in the university during the quarter of graduation.

CURRICULUM

In consultation with an advisor and in accordance with the above requirements, each student will select courses from the following list and approved electives to complete the requirements for the Master of Landscape Architecture degree.

Introduction to Information Technology in Landscape Architecture	LA	505/505L (1/2)
Foundations of Landscape Design	LA	509/509L (3/3)
Foundations of Landscape Design	LA	510/510L (3/3)
Design Graphics	LA	511/511L (2/2)
Methods and Applications for Landscape Architecture	LA	512/512L (3/3)
Landscape Awareness	LA	521/521L (3/1)
Landscape Construction and Design	LA	531/531L (2/2)
Landscape Construction and Design	LA	532/532L (2/2)
Plant Ecology and Design	LA	540/540L (2/3)
Landscape Planting	LA	541/541L (2/2)
Seminar on the Profession	LA	551 (2)
Seminar on Theory and Literature	LA	552 (2)
Seminar on Professional Directions	LA	553 (2)
Seminar on Human Behavior in the Landscape	LA	555 (2)
Seminar on Human Behavior and Landscape Design	LA	556 (2)
Advanced Information Technology in Landscape Architecture	LA	565/565L (2/1)
Seminar on Landscape Planning	LA	576 (4)
Design Research	LA	601 (4)
Landscape Design and Natural Processes	LA	602/602L (3/3)
Environmental Analysis	LA	604/604L (2/3)
Ecosystematic Landscape Design	LA	606/606L (3/6)
Landscape Technology	LA	632/632L (3/3)
Graduate Seminar	LA	652 (2)
Independent Study	LA	692 (1-6)
Thesis/Project Research	LA	694 (1-4)
Master's Degree Project	LA	695 (4)
or Master's Degree Thesis	LA	696 (4)

GRADUATE COURSE DESCRIPTIONS

LA 505/505L Introduction to Information Technology in Landscape Architecture (1/2)

Introduction to information technology appropriate to practice and research in landscape architecture. Course covers computer applications for design analysis, conceptualization, development, and communication. 1 lecture-discussion; 2 two-hour laboratories. Concurrent enrollment required.

LA 509/509L Foundations of Landscape Design (3/3)

Principles and techniques of basic design as applied to shaping the landscape. Concepts in visual thinking, introduced and developed by means of studio exercises, and their importance in design concepts. Offered summer quarter only. To be taken during summer quarter concurrently with LA 511/511L and LA 521/521L. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required.

LA 510/510L Foundations of Landscape Design (3/3)

Principles and techniques of environmental design applied to shaping the landscape; development of landscape design skills. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required.

LA 511/511L Design Graphics (2/2)

Techniques of graphic communication for environmental design; freehand sketching, orthogonal drafting; audio-visual presentation applied to the development and presentation of design ideas and proposals. To be taken during summer quarter concurrently with LA 509/509L and LA 521/521L. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required.

LA 512/512L Methods and Applications for Landscape Architecture (3/3)

Examination of concerns underlying landscape design and planning and processes for dealing with them at scales from the very small project to the region; emphasis on applied ecology, systems techniques, and environmental policy and management as well as design and planning techniques. 3 lecture discussions, laboratory 9 hours to be arranged. Concurrent enrollment required. Prerequisite: LA 510/510L or degree in design discipline.

LA 521/521L Landscape Awareness (3/1)

Sensory exploration of natural and man-made environments in relation to historical and contemporary theory and philosophy of landscape architecture; discussion and analysis of contemporary movements and the various roles of the landscape architect. To be taken during summer quarter concurrently with LA 509/509L and LA 511/511L. 3 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required.

LA 531/531L, LA 532/532L Landscape Construction and Design (2/2) (2/2)

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. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required.

LA 540/540L Plant Ecology and Design (2/3)

Exploration and study of plant associations of southern California and the environmental factors that control these communities as related to planting design theory and application. Identification of native and adapted species; introduction to cultural, functional, and aesthetic criteria in the organization of design associations of plants. 2 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required.

LA 541/541L Landscape Planting (2/2)

Selection of plant association for the developed landscape on the basis of culture, utility, and visual character; identification, classification, and use of common plants. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required.

LA 551 Seminar on the Profession (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. 1 two-hour seminar.

LA 552 Seminar on Theory and Literature (2)

Review and analysis of the existing body of literature concerning landscape architecture, relationships between humans and the natural environment, and humans and the designed environment. 1 two-hour seminar.

LA 553 Seminar on Professional Directions (2)

Analysis and discussion of current and future activities in the profession of landscape architecture; emphasis on individual development and specialization. 1 two-hour seminar. Prerequisite: LA 552.

LA 555 Seminar on Human Behavior in the Landscape (2)

Analysis and discussion of human behavior in designed environments, methods of observation and recording of behavioral activities. Application of behavioral analysis to design. 1 two-hour seminar.

LA 556 Seminar on Human Behavior and Landscape Design (2)

Analysis and discussion of design theory and application as a response to human needs and behavior. 1 two-hour seminar/discussion. Prerequisite: LA 555.

LA 565/565L Advanced Information Technology in Landscape Architecture (2/1)

Investigation and application of information technology appropriate to practice and research in landscape architecture. Course covers advanced computer applications for design analysis, conceptualization, development, and communication, as well as issues of ethics and information literacy related to information technology and design. Course may be repeated. Maximum credit 6 units. 2 hours lecture, 1 two-hour activity.

LA 576 Seminar on Landscape Planning (4)

Investigation and discussion of political, economic, social and institutional influences on planning decisions and policy formulation with particular concentration on issues related to the natural environment. 1 four-hour seminar.

LA 601 Design Research (4)

Investigation and discussion of basic research methods; development of design research techniques and skills. 2 two-hour lecture discussions. Prerequisite: LA 512/512L or permission of instructor. Unconditional standing required.

LA 602/602L Landscape Design and Natural Processes (3/3)

Application of ecosystematic principles and methods to physical problems of landscape design, encompassing a broad and complex range of human and natural considerations. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisite: LA 512/512L. Unconditional standing required.

LA 604/604L Environmental Analysis (2/3)

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. 2 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisites: LA 512/512L, LA 602/602L, and LA 601 or permission of instructor. Unconditional standing required.

LA 606/606L Ecosystematic Landscape Design (3/6)

Application of the ecosystematic approach to complex large-scale problems of landscape design and natural resource planning. May be repeated. Maximum credit 18 units. 3 lecture discussions, laboratory 18 hours to be arranged. Concurrent enrollment required. Prerequisite: LA 604/604L or permission of instructor. Unconditional standing required.

LA 632/632L Landscape Technology (3/3)

Application of modern technology to landscape construction involving adaptation of the landscape for human purposes. 3 lecture discussions, 3 three-hour laboratories. Concurrent enrollment required. Prerequisites: LA 512/512L and LA 532/532L or degree in landscape architecture. Unconditional standing required.

LA 652 Graduate Seminar (2)

Seminar presentations and discussion of work in progress by graduate students. May be repeated. Maximum credit 4 units. 1 two-hour seminar. Unconditional standing required.

LA 692 Independent Study (1–6)

Independent study and research on a subject chosen by the student with the consultation, approval, and direction of an advisor. Course may be repeated. Maximum credit, 12 units. Unconditional standing required.

LA 694 Thesis/Project Research (1–4)

Research conducted as part of the preparation for writing a thesis or preparing a graduate project. Open only to unconditional graduate students with the approval of the graduate advisor. Course may be repeated. Maximum credit 4 units. Prerequisite: LA 601. Unconditional standing required.

LA 695 Master's Degree Project (4)

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 an advisor. Prerequisite: LA 606/606L. Advancement to Candidacy required.

LA 696 Master's Degree Thesis (4)

Development of a terminal creative research report on a problem in landscape architecture selected by the student and approved by the graduate studies committee. Prerequisite: LA 606/606L. Advancement to Candidacy required.

LA 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Approval of department graduate coordinator is required to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

REGENERATIVE STUDIES

Master of Science in Regenerative Studies

At the John T. Lyle Center for Regenerative Studies, College of Environmental Design

www.csupomona.edu/~crs

Kyle D. Brown, Director
Denise Lawrence, Graduate Coordinator

Graduate Faculty

Denise Lawrence, Graduate Coordinator
Juan Araya, Lyle Center
Pablo La Roche, Architecture
Lisa Nelson, Political Science
Jerry Mitchell, Urban and Regional Planning
Andrew Moss, English and Foreign Languages
Ronald Quinn, Biological Sciences
Charles Ritz, Mechanical Engineering
Jerry Taylor, Landscape Architecture
Hofu Wu, Architecture
Lin Wu, Geography and Anthropology
Terry Young, Geography and Anthropology

The multidisciplinary Master of Science degree in Regenerative Studies prepares individuals for active professional and research roles aimed at finding successful solutions to environmental problems in the 21st century. Regenerative Studies explores the means of supporting human life within the limits of available resources without degrading the environment: regenerative processes are those that recover and renew their own sources of energy and materials through cyclical flows. The term "regenerative" emphasizes the intention to restore natural systems, not merely sustain them, while integrating the needs of the human community. Because no single discipline possesses all the knowledge and skills required to resolve these complex issues, the Master of Science in Regenerative Studies emphasizes collaborating and communicating across disciplinary boundaries while developing depth of knowledge in a particular discipline.

The Master of Science in Regenerative Studies is offered at the John T. Lyle Center for Regenerative Studies, California State Polytechnic University, Pomona, using its 16-acre site as a living laboratory for hands-on research, education and demonstration. The Lyle Center is an intentionally designed human ecosystem. The buildings are designed to optimize solar heating, cooling and daytime lighting. The systems are integrated, with opportunities to experiment with renewable energy technologies, energy efficiency, food production and nutrition, water recycling and treatment systems, fish culture, animal systems, integration of designed and natural systems, and others. These support systems are part of everyday life at the Center and provide the laboratories for research and education. Faculty and students are drawn from many colleges and disciplines on campus in research and demonstration projects in the areas of energy production, solar design, water treatment, sustainable agriculture and nutrition, integrated waste management, human co-existence, social change and community building, and others. Facilitating and promoting multidisciplinary collaboration and interdisciplinary problem-solving involves university faculty, students and staff at the Lyle Center. Collaboration also includes outreach programs with local communities and international exchange programs that extend the academic community to a global scale.

The Master of Science in Regenerative Studies program accepts students from a variety of disciplinary backgrounds including environmental studies, environmental design, agriculture, physical sciences, engineering, business, social sciences and the humanities. Students are expected to continue their study in one focus discipline as part of the multidisciplinary coursework required for the Master of Science degree.

A total of 46-quarter units is required for the Master of Science in Regenerative Studies. Coursework commences with an intensive integrated core of Regenerative Studies courses (15 units), followed by a research methods course (4 units), discipline-focus elective courses (12 units) and synthesis seminars (7 units), and culminates in a thesis or project (8 units) to complete the program. The student's proposed course of study, including coursework to be taken in another discipline as well as any necessary prerequisites and the selection of the topic of the thesis/project, will be determined in consultation with the multidisciplinary Regenerative Studies Graduate Studies Committee. Prior to graduation, all students are required to fulfill 200 hours of internship of which a minimum of 100 hours must be completed at the Lyle Center and the remainder approved by the Graduate Studies Committee.

Students are expected to actively participate in the operations of the Lyle Center through coursework, research, demonstration and governance. A residential experience is considered optimum for graduate students to fully participate in "learning activities" at the Lyle Center. Alternative options can be arranged for those constrained by other commitments. The goal of the program is to transcend the traditional idea of environmental education by more fully integrating life support systems in an experiential context in order to better predict the consequences of our actions. The physical setting of the Lyle Center provides a unique laboratory in which to understand the interdependence and explore the integration of natural, human and technological systems as we propose and test solutions to our most pressing human-environment problems.

All students entering the Master of Science program in Regerative Studies are required to purchase a computer that meets the graduate program's specifications. Applicants should check with the Lyle Center office to obtain these specifications. Financial aid for this computer purchase is available to students qualifying for Federal Student Aid (requested via the FAFSA application). Please contact the University's Office of Financial Aid (909-869-3700) for additional information.

ADMISSION TO THE PROGRAM

Admission to the Master of Science in Regenerative Studies requires the applicant to have received a baccalaureate degree with an overall undergraduate grade point average (GPA) of at least 3.0 (B) or better. Applicants whose GPA falls between 2.5 and 3.0 will be considered for admission on a conditional basis if evidence of compensating qualifications is demonstrated.

Application procedures include a two-part process. Prospective applicants must submit to the University Admissions Office a completed application form, official transcripts from all universities and colleges attended, and TOEFL scores for non-native English speakers. Applicants must also submit to the Lyle Center a statement of purpose that identifies the discipline focus, and three letters of recommendation from individuals in a position to assess the applicant's potential for success in master's level academic performance (and participation in the Regenerative Studies program). Graduate Record Exam (GRE) scores are required from those applicants whose overall GPA in undergraduate work falls below 3.0, or if the bachelor's degree has been awarded from a non-accredited university of college (this includes foreign institutions), or if the applicant has not attended an accredited institution within the

past seven years. These applicants are required to submit scores from the General GRE test, although they may also submit Subject Area GRE scores in their special area of study for consideration.

Applications are accepted and reviewed once a year. After meeting prerequisites, students may begin Regenerative Studies graduate coursework only in fall quarter with the intensive core curriculum. Admission decisions and entry point competency will be determined by the Graduate Studies Committee. Applicants must also meet prerequisite requirements for discipline focus coursework. Applicants who are required to complete prerequisites in Regenerative Studies will be admitted with conditional standing, and all Regenerative Studies prerequisites must be satisfied before unconditional standing is granted and work on core courses of the graduate program can begin.

Prerequisites

Applicants who meet entry point competency will have completed the 30-unit undergraduate minor in Regenerative Studies at Cal Poly Pomona with a grade point average of 3.0 (B) or better; or will have had equivalent upper division coursework or experience in environmental studies or a combination of related work in the physical sciences, social sciences, engineering, environmental design, and/or humanities. Students without adequate prior preparation may be required to take up to 48 units of prerequisite coursework, and/or complete RS 501, to be determined in consultation with the Graduate Studies Committee. Applicants who lack the necessary prerequisites to enroll in discipline focus courses may enroll in Regenerative Studies courses, but will be required to meet prerequisites before taking courses in their focus discipline.

PROGRAM REQUIRMENTS

Admission to the program does not guarantee the student will be able to attempt a thesis or project. Permission to undertake the thesis/project is granted to a student upon the recommendation of the Graduate Studies Committee and implies a readiness to attempt the project or thesis based on grades, performance in coursework and internship. Students who have not received this permission are not eligible to register for RS 695 or 696.

In order to complete a degree and receive a Master of Science in Regenerative Studies the student must, in addition: (1) satisfy the Graduate Writing Test; (2) satisfy all prerequisites required for admission to the program; and (3) with the Graduate Studies Committee, develop and file a program of study, including a specific discipline focus, and have it approved by the Graduate Studies Analyst, and by the Graduate Coordinator for Regenerative Studies. The curriculum specified in the program may be altered only by written petition which shall be submitted in accordance with university regulations.

Thesis or project approval will be granted by the Graduate Studies Committee based on criteria developed and approved by the candidate's thesis or project advisory committee, one member of which must be a current member of the Graduate Studies Committee.

Prior to graduation, all students are required to fulfill 200 hours of internship activity of which a minimum of 100 hours must be completed at the Lyle Center, and the remainder approved by the Graduate Studies Committee. This work must be verified with the Lyle Center Internship Coordinator.

CURRICULAR REQUIREMENTS

A minimum of 46-quarter units of graduate work and 200 hours of approved internship hours must be completed in the graduate program. Prerequisite courses for admission and for discipline-focus courses are in addition to this minimum. Discipline-focus courses must be approved by the Graduate Studies Committee. 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 the university.

No more than 13 units of acceptable graduate credit may be transferred from another graduate institution or petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, or other units petitioned for graduate credit may be included on a master's program contract. The stipulated time limit of 7 years applies to all of the above.

The following courses are required for all graduate students in Regenerative Studies: RS 510/510L, RS 520/520L, RS 530/530L, RS 540/540L, RS 550, RS 640, RS 650 (26 units), RS 694 and RS 695 or RS 696 (8 units).

Each student must identify a discipline focus and complete a minimum of 12 graduate or upper division units in the designated discipline.

The candidate must be enrolled in the university during the quarter when qualification to graduate is attained.

CURRICULUM

Required Courses

Regenerative Practices*	RS	501	(4)
Habitat and Community	RS	510/510L	(3/2)
Nature as Model	RS	520/520L	(3/2)
Regenerative Technologies	RS	530/530L	(3/2)
Methods and Applications for Regenerative Systems	RS	540/540L	(3/1)
Seminar in Research Methods I	RS	550	(2)
Coalition Building	RS	640	(3)
Seminar in Research Methods II	RS	650	(2)
Thesis/Project Research	RS	694	(4)
Master's Project	RS	695	(1-4)
or Master's Thesis	RS	696	(4)

*Not required for program, may be used as a prerequisite or taken by graduate students from other majors or qualified undergraduate students

GRADUATE COURSE DESCRIPTIONS

RS 501 Regenerative Practices (4)

Theory, case studies and strategies in five areas of regenerative practice: energy and water conservation, sustainable agriculture, shelter and waste management. Multidisciplinary problem solving. Technical, economic, political and ethical issues. Seminar and practice exercises. May be required as a prerequisite for students entering the graduate program, can be used as an elective by students in other majors.

RS 510/510L Regenerative Concepts and Social Practices (3/2)

Regenerative Concepts and Social Practices (3/2): Exploration of the history and theories contributing to contemporary regenerative approaches. Investigations into the individual and social practices that lead to successful regenerative human behavior and communities. Three hour lecture, 6 hour lab. Prerequisite: unconditional standing in Regenerative Studies, or RS 501, or equivalent. Concurrent enrollment in RS 520/520L, 530/530L required.

RS 520/520L Nature as Model (3/2)

The biosphere as model for regenerative practices with strategy implications. Comparison between natural and human-engineered systems in terms of costs, resource conservation, environmental protection, social values. Seminar and lab using the Lyle Center for Regenerative Studies as the investigation site. Three hour lecture, 6 hour lab. Prerequisite: unconditional standing in Regenerative Studies, or RS 501 or equivalent. Concurrent enrollment in RS 510/510L, 530/530L required.

RS 530/530L Regenerative Technologies (3/2)

Investigation of cultural, philosophical, ethical, economic, political and technological orientations to the idea of appropriate technologies in regard to quality of human life and environmental sustainability. Seminar and lab using the Lyle Center for Regenerative Studies as the investigation site. Three hour lecture, 6 hour lab. Prerequisite: unconditional standing in Regenerative Studies, or RS 501 or equivalent. Concurrent enrollment in RS 510/510L, 520/520L required.

RS 540/540L Methods and Applications for Regenerative Systems (3/1)

Investigation and application of regenerative principles and methods to contemporary environmental problems, encompassing a broad range of social and ecological considerations. One 3-hour lecture and one 3-hour laboratory. Concurrent enrollment required. Prerequisites: RS 510/510L, RS 520/520L, RS 530/530L.

RS 550 Seminar in Research Methods I (2)

Explore multidisciplinary research methods and their application in regenerative studies. Discussions focus on distinction and integration of research methods in different disciplines and their application in regenerative systems research, design, and practice. Open to graduate students from other disciplines. Two-hour seminar. Prerequisites: RS 510/510L, 520/520L, 530/530L or permission of instructor.

RS 599/599L Special Topics for Graduate Students (1–4)

Selected issues, programs, and themes in sustainable environments, chosen by faculty to address student interests. Seminar 1 to 4 hours. May be repeated for a maximum of 8 units. Prerequisite: permission of instructor.

RS 640 Coalition Building (3)

Constructive processes and methods of building coalitions to strengthen public awareness and create policy supporting regenerative practices. Theory and case studies of successful partnerships among government, business, community and environmental groups. Role of the media, judicial and political processes. Three hour lecture. Prerequisites: RS 510/510L, 520/520L, 530/530L.

RS 650 Seminar in Research Methods II (2)

In-depth exploration of multidisciplinary research methods and their application in regenerative studies. Discussions focus on distinction and integration of research methods in different disciplines and their application in regenerative systems research, design, and practice. Open to graduate students from other disciplines. Two-hour seminar. Prerequisites: RS 550 or permission of instructor.

RS 691 Directed Research (1–4)

Individual research in a specialized area under the supervision of a graduate faculty member. May or may not lead to a Thesis or Project. Open only to students who have completed core courses for the Master of Science in Regenerative Studies.

RS 692 Independent Study (1–4)

Independent research or readings proposed by the student in consultation with and with approval of a faculty member who will supervise the work. May not be used to lead directly to the thesis/project but may be used as a Discipline Focus course. Prerequisite: Unconditional standing, or permission of instructor. Maximum of 4 units possible.

RS 694 Thesis/Project Research (4)

Research leading to thesis or project for Master's Degree. May be repeated.

RS 695 Master's Project (4)

Project concerning a significant problem in sustainable environments. May be client-oriented. Normally the final course of culmination research, synthesizing learning from earlier courses. Required for students selecting a Project option for the MRS Degree. Total credit limited to 4 units. Prerequisite: RS 694.

RS 696 Master's Thesis (4)

A formal thesis concerning a significant problem in the field of regenerative studies. Required for students selecting the Thesis option for the MRS Degree. Open to students who have completed all other required coursework for the MRS. Prerequisite: RS 694.

RS 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Approval of department graduate coordinator is required to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

URBAN AND REGIONAL PLANNING

Master of Urban and Regional Planning

In the Department of Urban and Regional Planning, College of Environmental Design
www.csupomona.edu/urp

Jerry V. Mitchell, Chair
Herschel Farberow, Graduate Coordinator

Felix Barreto
Julianna Delgado
Charles E. Loggins
Gwendolyn H. Urey
Ana Maria C. Whitaker
Richard W. Willson

The Master of Urban and Regional Planning at Cal Poly Pomona prepares individuals for leadership roles in urban and regional planning. Offered in the evening, it provides an opportunity to gain a Masters degree while obtaining significant professional planning experience. Most students support themselves through professional planning work rather than teaching assistantships. Full-time study requires two years; students with extensive professional obligations may complete the program over three or more years.

The program helps practicing planners advance in their careers and provides entry to the profession for students from a wide range of academic disciplines and work experiences. Coursework takes advantage of the rich research and practice opportunities available in southern California. The program is further distinguished by the following characteristics:

- A commitment to linking theory and practice.
- A strong physical design component.
- Opportunities for interdisciplinary collaboration with students in Architecture, Landscape Architecture, Engineering, and Regenerative Studies.
- The option of a thesis or comprehensive exam.

The program offers specializations in land use and design, community development, environmental policy, and transportation policy. Recent initiatives include increased coursework in Geographic Information Systems (GIS), negotiation and visioning, and leadership. International experiences are available, including an interdisciplinary China studio program offered in conjunction with North China University of Technology.

As of fall 2007, all undergraduate and graduate students entering College of Environmental Design majors are required to purchase a computer that meets departmental specifications. All applicants are invited to check with their department office or go to the department's website to obtain these specifications. Financial aid assistance for this computer purchase is available to students qualifying for Federal Student Aid (requested via the FAFSA application). Please contact the University's Office of Financial Aid (909-869-3700) for additional information.

Employers laud the program's graduates for their preparation for professional practice, and a large alumni network welcomes them as colleagues. The program has been accredited by the Planning Accreditation Board (or its equivalent) since 1974 and is the only Cal State graduate professional planning program in Southern California. While most graduates become planning practitioners, some pursue Ph.D.s and teaching and research careers. The program is rated #6 in the west and #22 nationwide by "The Guide to Graduate Urban Planning Programs" (2006). In addition, the program is rated #6 nationwide for the field of zoning administration and #1 nationwide for diversity of the student body.

Professional planners improve the quality of the built and natural environments by developing creative solutions to environmental, transportation, housing, social, economic, and design problems at urban, regional, and national levels. Graduate study leads to the Master of Urban and Regional Planning degree which qualifies graduates for management-level employment in a variety of departments at all levels of government, as well as in private consulting. Graduates also work for public foundations, non-profit corporations, and environmental or public interest groups.

The program offers a broad, interdisciplinary, and rigorous curriculum that combines lectures, seminars, and studio projects. The program features extensive contact with faculty. All required core courses are offered in the evening to accommodate working students. The Master of Urban and Regional Planning Program is fully accredited by the Planning Accreditation Board and has been cited as a national model for the education of planners.

ADMISSION TO THE PROGRAM

Admission to the Master of Urban and Regional Planning program requires an undergraduate grade point average of 3.0 (B) or better, three letters of recommendation, and a "Statement of Purpose" setting out the applicant's interest in planning, along with a brief background. An applicant with an undergraduate grade point average between 2.5 and 3.0 will be considered for admission on the basis of scores on the Graduate Record Examination (GRE). A minimum score required on this exam is 1000 on the combined scores in the verbal and quantitative portions with not less than 450 on either part. Applicants with an undergraduate grade point average of 3.0 or better are not required to take the GRE.

Students are admitted into the program from a variety of disciplines and work backgrounds. Following admission, the student and the Graduate Coordinator prepare an individual program that specifies all courses and other requirements that the student must fulfill to earn the master's degree. Students select a specialization module in one of four areas: environmental policy, community development, land use and design, or transportation policy. Each student's elective program is designed to fit individual needs and interests. The Graduate Coordinator must approve selection of all elective courses. There are opportunities to take interdisciplinary design courses during the summer and to participate in international planning education programs.

REQUIREMENTS

Seventy-two units must be completed in the graduate degree program. Certain required courses may be substituted by 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.

No more than 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.

No course below the 400 level will be accepted for graduate credit. A grade point average of "B" (3.0) or better must be maintained in all graded course work at this University attempted by degree-declared graduate students in the Urban and Regional Planning program, and in all courses used to satisfy degree requirements. A maximum of eight

units with the grade of "C" (2.0) will be accepted for credit.

Completion of the Program

Students must pass the Graduation Writing Test and all courses on the student's contract to complete the program. Students may elect to complete the final part of their contract by either developing a master's thesis or by successfully completing the master's comprehensive exam. The exam is given once a year in the spring quarter. Students must take the exam preparatory course given in the winter quarter in order to take the exam that spring. The thesis and exam options are all six units each and may be completed in a minimum of two quarters. Enrollment in thesis must begin by the first quarter of the seventh year after the first course taken in pursuit of the MURP degree. In no case will an extension be granted for a thesis or exam that is not completed by the end of the seventh year. An oral defense of the thesis or exam is required.

CURRICULUM

Introduction to Graphic Communication and Physical Design	URP	501/501L	(3)
Urban Analysis Fundamentals	URP	502L	(1)
The Economic, Social and Environmental Context for Planning	URP	505	(4)
Legal Foundations of Urban and Regional Planning	URP	506	(4)
Urban and Regional Planning Theory and Practice	URP	512/512A	(4)
Urban and Regional Planning Research Methods	URP	521/521L	(4)
Urban and Regional Planning Data Analysis and Simulation	URP	522/522L	(4)
Policy Analysis, Implementation and Evaluation	URP	523/523L	(4)
Social and Political Planning Policy	URP	551	(4)
Graduate Planning Studio I	URP	641/641L	(4)
Graduate Planning Studio II	URP	642/642L	(4)
Planning Administration and Professional Practice	URP	652	(2)
Independent Study with Comprehensive Exam or Master's Degree Thesis	URP	692 696	(6)

Specialization module courses	(12)
Electives	(12)
Total Units	(72)

SPECIALIZATION MODULE COURSES/SPECIALIZATION COURSES

Students must develop an area of specialization. Each specialization area is composed of 12 units and must be approved by the Graduate Coordinator. Selected courses for the specialization must meet department guidelines. Students may use 400–level planning courses with the approval of the Graduate Coordinator. Please see the undergraduate section of the catalog. With the Graduate Coordinator's approval, students may also use graduate and 400–level undergraduate courses in other departments and off campus to complete an approved specialization. Suggested areas of specialization are listed below along with the appropriate core course(s).

Environmental Policy

Environmental Policy for Planning	URP	537	(4)

Land Use and Design

Land Use Planning and Design	URP	538/538L	(4)

Community Development

Community Development Theory and Process	URP	434/434A	(4)

Transportation Policy

Local Transportation Planning	URP	488/488L	(4)
Regional Transportation Planning and Policy	URP	535	(4)

URP GRADUATE ELECTIVES (12 units)

Evolution of the Planning Process	URP	513	(4)
GIS Planning Support Systems	URP	525/525L	(3/1)
Housing and Community Development	URP	534	(4)
Directed Study	URP	691	1-2

Elective courses to complete the required minimum of 72 units may be selected from those listed above, 400-level planning courses or any 400, 500, or 600-level course of this university with the approval of the Graduate Coordinator. Specialization module courses may be used as electives. The student should select a group of electives that will help either to specialize in one area or to broaden the student's background and acquire a wider area of competence.

GRADUATE COURSE DESCRIPTIONS

URP 501/501L Introduction to Graphic Communication and Physical Design Skills (1/2)

Introduction to basic planning graphic and design techniques. Covers issues such as mapping, presentation and report graphics, site planning, development processes and computer applications. Concurrent enrollment is required. 1 lecture discussion, 2 three-hour laboratories.

URP 502L Urban Analysis Fundamentals (1)

Intensive course focusing on a selected communication or analysis skill, the subject to be specified in advance. Topics may include listening and communication skills, report writing, negotiation/mediation processes, computer analysis, mapping or graphics, photography, etc. May be repeated for elective credit. 1 laboratory.

URP 505 The Economic, Social and Environmental Context for Planning (4)

Development of the economic and social structure of cities. Environmental factors in cities and regions. Historical development and current issues. Explores the forces that shape and affect possibilities for cities and regions. 4 lecture discussions.

URP 506 Legal Foundations of Urban and Regional Planning (4)

Legal and institutional framework for planning. Emphasis is placed on understanding federal and state requirements for planning, constitutional rights, and key legislation. 4 lecture discussions.

URP 512/512A Urban and Regional Planning Theory and Practice (2/2)

Application of planning theory to planning practice. Use of planning methods, research techniques, and decision theory in application to a range of urban problems. 2 lecture discussions, 2 seminars. Concurrent enrollment required.

URP 513 Evolution of the Planning Process (4)

Development of urban patterns in the context of planning. Introduction to the history of urban form and the contribution of the planning profession to civic improvement. 4 lecture discussions.

URP 521/521L Urban and Regional Planning Research Methods (3/1)

Introduction to the use of probability and statistics in urban and regional planning research. Basic planning techniques; data analysis and display; projection techniques; land use surveys and coding; simple models; economic base and locational analysis; electronic data processing. 3 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required. Prerequisite: URP 512.

URP 522/522L Urban and Regional Planning Data Analysis and Simulation (3/1)

Introduction to data analysis and computers. Mathematical models related to land-use, and population projections and estimates. Application of data analysis in the solution of research problems, research design and project management. 3 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required. Must be taken immediately following URP 521/521L. Prerequisite: URP 521/521L.

URP 523/523L Policy Analysis, Implementation and Evaluation (3/1)

Evaluation methods of public policies and private decisions on the public welfare, using quantitative and qualitative analytic tools. Emphasis is on application of statistical approaches, cost-benefit analysis, computer aided mapping and survey techniques to contemporary issues in planning. 3 lecture discussions, 1 three hour laboratory. Concurrent enrollment required. Prerequisite: URP 522/522L.

URP 525/525L GIS Planning Support Systems (3/1)

This is a Service Learning course. Introduction to Geographic Information Systems (GIS), databases, and digital mapping/visualization tools used in the field of Urban and Regional Planning. Students learn the fundamental conventions and capabilities of GIS through hands-on applications. Emphasis is placed on Vector (i.e. drawing-based) and overlay analysis as opposed to Raster (i.e. image-based) GIS and spatial analysis. 3 hours lecture/3 hours lab.

URP 534 Urban Housing and Community Development (4)

Housing requirements and prospects; local, state, and federal housing and community development policies; alternative solutions to housing problems. 4 lecture discussions. Prerequisite URP 505.

URP 535 Regional Transportation Planning and Policy (4)

Understanding factors in land use, travel behavior, politics and finance that shape regional transportation policy choices. Examination of policy issues in regional transportation planning. Planning and evaluation methods in regional transportation policy. 4 lecture discussions. Prerequisite: URP 505.

URP 537 Environmental Policy for Planning (4)

Theories, ethics and methods of environmental planning in an intergovernmental context. Analysis of environmental equity in facility siting and urban design. Review of environmental elements for general plans, risk analysis, and habitat conservation planning. 4 lecture discussions. Prerequisite: URP 512.

URP 538/538L Land Use Planning and Design (3/1)

Methods of analyzing how people use and perceive public space. Principles of land-use organization and design. Translating design concepts to guidelines and policy. Concurrent enrollment required. 3 seminars, 1 three-hour laboratory. Prerequisite: URP 501/501L.

URP 551 Social and Political Planning Policy (4)

Survey of contemporary urban conditions from a social policy perspective. Basic principles and practices of contemporary social policy planning. Methods by which urban social trends are analyzed, social indicators developed and applied to program development and analysis. Established social, economic and political institutional considerations, centralized and decentralized social policy-decision models. 4 lecture discussions. Prerequisite: URP 512.

URP 641/641L Graduate Planning Studio I (2/2)

Theory, process, design and method for strategic planning demonstrated by studio problems based on field studies. Synthesis of graduate planning coursework reviewed through practical application. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Prerequisite: URP 522/522L. Unconditional standing required.

URP 642/642L Graduate Planning Studio II (2/2)

Continuation and completion of the plan formulation begun in URP 641/641L. Must be taken immediately following URP 641/641L. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Unconditional standing required.

URP 652 Planning Administration and Professional Practice (2)

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. 2 lecture discussions. Prerequisites: URP 512. Unconditional standing required.

URP 691 Directed Study (1–2)

Independent investigation of an urban and regional planning topic selected by the student preparatory to enrollment in project or thesis and conducted under the direction of a graduate faculty member. May not be taken for credit/no credit. May be repeated for a maximum of 4 units. Unconditional standing required.

URP 692 Independent Study with Comprehensive Examination (4)(2)

A two-part terminal requirement. The first part includes study, research, and readings (not leading to a thesis or project) proposed by the student with consultation and approval and supervision of the Graduate Coordinator and graduate faculty members. The second part contains the written portion and examination conducted by the committee of faculty members. Advancement to Candidacy required.

URP 696 Master's Degree Thesis (3) FWSp

Development of a terminal research report on a topic selected by the student, approved by the graduate studies committee and conducted under the direction of a Thesis Committee chosen by the student. The Thesis Committee will consist of three graduate faculty or, with the permission of the Thesis Committee Chair, two graduate faculty and a third outside member who has recognized expertise in the thesis topic. 6 units required. Advancement to Candidacy required.

URP 699 Master's Degree Continuation (0) FWSp

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Approval of department graduate coordinator is required to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

COLLEGE OF LETTERS, ARTS, AND SOCIAL SCIENCES

www.class.csupomona.edu/

Carol P. Richardson, Dean
Sharon Hilles, Associate Dean
_____, Associate Dean

The College of Letters, Arts, and Social Sciences advances knowledge and learning in established academic disciplines in the humanities, social sciences, and performing arts. It provides introductory and advanced course work in more than 20 degree and certificate programs.

Master's degrees are offered in economics, English, history, psychology, public administration, and kinesiology. Through its curriculum, research activities, arts performances, and other humane activity, the College of Letters, Arts, and Social Sciences promotes activity integral to processes of inquiry, creativity, learning, and teaching.

In accord with the mission of a comprehensive polytechnic university "preparing students for life, leadership, and careers in a changing, multicultural world," the College of Letters, Arts, and Social Sciences seeks to equip students with lifelong learning skills enabling them more effectively to challenge problems of extraordinary social, technical, and human complexity. These skills include creative and critical thinking, methods of both quantitative and qualitative inquiry, the application of theory to practice, learning through performance-based activities in the humanities, arts and social sciences, and the integration of mind and body in health and wellness activity. In furthering its mission of promoting learning and teaching as broad-based, ongoing, and shared processes, the College of Letters, Arts, and Social Sciences supports initiatives that further the professional development of faculty and staff, that engage students and faculty in active collaboration in the pursuit and dissemination of knowledge, and that integrate the arts, sciences, and technologies. The College thus advances collegiality not only among the various segments of the University, but also with the local and global communities it serves. It promotes access of underrepresented student populations to its programs, resources, and services.

The College of Letters, Arts, and Social Sciences offers six postbaccalaureate programs leading to Master of Arts degrees in English or History, Master of Science degrees in Economics, Kinesiology, or Psychology, or a Master of Public Administration degree. The programs are designed to (1) provide professional development for individuals teaching K-12, (2) provide advanced training for individuals who wish to pursue careers in a variety of professional settings, (3) prepare individuals to pursue advance graduate degrees (e.g., Ph.D., M.D., J.D.) or teach at the community college level. Our programs will be appropriate for individuals who are interested in careers in:

- Economics
- English literature, composition, or teaching English as a second language
- Health, fitness, and exercise science
- History
- Marriage and family counseling, and
- Public administration.

For further information regarding these programs, please see program descriptions below and contact the Graduate Coordinator for the program.

DEPARTMENTS OFFERING GRADUATE DEGREE PROGRAMS

ECONOMICS

Nestor Ruiz, Chair; Master of Science in Economics: Subplans in Economic Analysis, Environmental and Natural Resource Economics, and Financial Economics

ENGLISH AND FOREIGN LANGUAGES

Liliane Fucaloro, Chair; Master of Arts in English, Subplans in Rhetoric/Composition, Literature, and Teaching English as a Second Language

HISTORY

Daniel Lewis, Chair; Master of Arts in History

KINESIOLOGY AND HEALTH PROMOTION

Perky Vetter, Chair; Master of Science in Kinesiology, Subplan in Sports Nutrition

POLITICAL SCIENCE

Charles W. Gossett, Chair; Master of Public Administration

PSYCHOLOGY AND SOCIOLOGY

Laurie Roades, Chair; Master of Science in Psychology

ECONOMICS

MASTER OF SCIENCE IN ECONOMICS

In the Department of Economics, College of Letters, Arts, and Social Sciences

www.class.csupomona.edu/ec/home.htm

Lynda Rush, Chair
Dr. Carsten Lange, Graduate Coordinator

The goals of the Master of Science program 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 the following economic areas: financial, environmental and resources, and economic analysis.

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 who holds 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. Conditional students may not take 500- and 600-level courses until they have met the conditions of admission. They must receive a B or better in all conditional courses. Failure to meet this condition will result in automatic termination from the program. In undergraduate work, the applicant must have maintained a grade point average of 3.0 (B) or better in economics courses and a grade point average of 2.7 overall. Admission to the graduate program in economics requires that the applicant be accepted by the Department of Economics.

REQUIREMENTS

For the most recent list of requirements and deparment policies, please visit our graduate website.

A minimum of 45 quarter units is required for the Master of Science degree in Economics. Each student must take 16 units of required core courses. Courses for the balance of the 45 quarter units are selected by the individual student in the area of interest or specialization with the advice and consent of appropriate faculty advisor(s).

No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.

A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.

A maximum of 16 units may be taken in approved upper-division 400-level courses. A grade point average of 3.0 (B) must be maintained in core courses. A grade point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and all graduate work.

The minimum acceptable grade for each core course is a B- (2.7). No course credit will be allowed if a student earns a C- or below in a class. 400-level courses are not acceptable for a contract when equivalent graduate courses are offered, or if a student has taken the class as an undergraduate.

The Graduation Writing Test (GWT) must be passed prior to Advancement to Candidacy.

After completion of 13 units, students must have on file an approved "Program for the Master of Science Degree in Economics."

To attain Advancement to Candidacy for the degree, each student shall indicate in writing the decision as to the manner of fulfilling the terminal requirement. The candidate will satisfy the culminating experience with either a thesis or a comprehensive examination.

The candidate must be enrolled in the university during the quarter of graduation.

CURRICULUM

The Department of Economics offers the Master of Science degree in Economics with the following subplans. All options require a field of specialization.

a) Financial Economics

b) Environmental and Natural Resource Economics

c) Economic Analysis

The Financial Economics Subplan provides students with a background that leads to opportunities in the private sector financial and non-financial institutions, government regulatory agencies, and research institutes. This subplan integrates extensive campus-wide resources and provides an interdisciplinary focus.

The Environmental and Natural Resource Subplan utilizes campus-wide resources to provide students with a program unique to Cal Poly Pomona and the Southern California Region. Environmental and natural resource economics is a growing research area. In recent years, Cal Poly Pomona started Landlab and has a research agreement with the South Coast Air Quality Management District.

The Economic Analysis Subplan emphasizes analytic techniques and methods (both quantitative and qualitative) with applications to various specialized areas. This subplan prepares students to pursue Ph.D. work in economics or to hold research, administrative, and teaching positions in the public and private sectors.

REQUIRED CORE COURSES FOR ALL SUBPLANS

Microeconomic Analysis	EC	550	(4)
Macroeconomic Analysis	EC	551	(4)
Econometrics	EC	552, 553	(4,4)
Comprehensive Examination	EC	697	(1)
Total			(17)

FINANCIAL ECONOMICS SUBPLAN

Field of Specialization (Required)			
Money and Capital Markets	EC	656,657	(4,4)
Electives from the list below			(20)

Before taking a course, students must meet the prerequisites of the selected courses or obtain permission from the instructor of the course. Students must consult their advisor before selecting courses.

Although students may take up to 16 units of 400-level courses, students

cannot, in general, take 400-level courses if similar graduate courses are offered. If 400-level courses are offered that complement the student's field of specialization, then the student is encouraged to take these classes prior to completing the appropriate graduate courses.

Note that all 400-level courses have to be approved by the student's graduate advisor and the Economics Department's graduate program coordinator. No 400-level course can be taken after the completion of a similar graduate course.

Economics of International Finance	EC	654	(4)
Fundamentals of Financial Management	GBA	546	(4)
Investment Banking	GBA	612	(4)
Security Analysis and Portfolio Management	GBA	647	(3)
Directed Study in Security and Portfolio Management	GBA	648	(1)
(Concurrent enrollment in GBA 647 is required to take GBA 648)			
Legal Implications of Financial Transactions	FRL	403	(4)
Security Options	FRL	431	(4)
Futures Markets: Financial Instruments and Commodities	FRL	432	(4)
Multinational Financial Management	FRL	453	(4)
Commercial Banking	FRL	460	(4)
Directed Study	EC	691	(1-4)
Thesis	EC	696	(2-5)

Summary:

Total Core Courses	(17)
Field of Specialization	(8)
Electives	(20)
Total Degree Requirement	(45)

ENVIRONMENTAL AND NATURAL RESOURCE ECONOMICS SUBPLAN

Field of Specialization (Required)

Seminar in Environmental Economics	EC	530	(4)
Seminar in Natural Resource Economics	EC	531	(4)
Electives from the list below			(16-20)

Before taking a course students must meet the prerequisites of the selected course or obtain permission from the instructor of the course. Students should consult their advisor before selecting courses.

Although students may take up to 16 units of 400-level courses, students cannot in general, take 400-level courses if similar graduate courses are offered. If 400-level courses are offered that complement the student's field of specialization, then the student is encouraged to take these classes prior to completing the appropriate graduate courses.

Note that all 400-level courses have to be approved by the student's graduate advisor and the Economics Department's graduate program coordinator. No 400-level course can be taken after the completion of a similar graduate course.

Agricultural Water Resource Management	ABM	450	(4)
Air Pollution Control	ARO	418	(4)
Water Pollution Biology	BIO	420	(3)
Air Pollution Problems	CHM	460	(4)
Solid Waste Management	CE	457	(4)
Pollution Abatement and Hazardous Materials Management/Laboratory	CHE	432/433	(3/1)
Unit Processes in Waste and Waste Water Treatment	EGR	567	(3)
Biological Unit Process in Waste Water Treatment	EGR	568	(4)
The Urban Landscape	LA	423/423L	(2,1)
Environmental Factors in Regional Planning	URP	487	(4)
The Economic, Social and Environmental Context for Planning	URP	505	(4)
Urban and Regional Planning Theory and Practice	URP	512/512A	(4)
Evolution of the Planning Process	URP	513	(4)
Policy Analysis, Implementation and Evaluation	URP	523	(4)
Urban Housing and Community Development	URP	534/534A	(4)
Urban Transportation and Circulation System	URP	636/636L	(4)
Environmental Policy for Planning	URP	637	(4)
Land Use Planning and Design	URP	638	(4)
Social and Political Planning	URP	651	(4)
Sustainable Communities	ENV	450	(4)
Urban Forestry	HOR	420/420L	(4)
Environmentally Sustainable Agriculture	AGR	437/437L	(4)
Environmental Toxicology	AGB	411	(4)
Directed Study	EC	691	(1-4)
Thesis	EC	696	(2-5)

Summary:

Total Core Courses	(17)
Field of Specialization	(8)
Electives	(20)
Total Degree Requirement	(45)

ECONOMIC ANALYSIS SUBPLAN

Field of Specialization (Required) (8)
Field of specialization courses should be chosen from the approved list after explicit consultation with advisor.

Electives from the list below (16-20)

Before taking a course, students must meet the prerequisites of the selected courses or obtain permission from the instructor of the course. Students should consult their advisor before selecting courses.

Although students may take up to 16 units of 400-level courses, students cannot in general, take 400-level courses if similar graduate courses are offered. If 400-level courses are offered that complement the student's field of specialization, then the student is encouraged to take these classes prior to completing the appropriate graduate courses.

Note that all 400-level courses have to be approved by the student's graduate advisor and the Economics Department's graduate program coordinator. No 400-level course can be taken after the completion of a similar graduate course.

Seminar in Environmental Economics	EC	435	(4)
Air Resource Management	EC	436	(4)
Economics of Poverty and Discrimination	EC	437	(4)
Waste Management	EC	438	(4)
Water Resource Management	EC	439	(4)
Industrial Organization	EC	440	(4)
Industry Studies	EC	441	(4)
Money and of Capital Markets	EC	450	(4)
Seminar in Environmental Economics	EC	530	(4)
Seminar in Natural Resource Economics	EC	531	(4)
Managerial Economics and Operations Analysis	EC	560	(4)
Economics of International Finance	EC	654	(4)
Economics of International Trade	EC	655	(4)
Economics of Capital Markets	EC	656, 657	(4,4)
Seminar in Transportation Economics	EC	659	(4)
Public Finance	EC	660	(4)

Economic Development	EC	665	(4)
Economic Planning	EC	666	(4)
Directed Study	EC	691	(1-4)
Thesis	EC	696	(2-5)

Summary:

Total Core Courses	(17)
Field of Specialization	(8)
Electives	(20)
Total Degree Requirement	(45)

GRADUATE COURSE DESCRIPTIONS

EC 521 Business Economics (4)

The role of business firms in the resources allocation process. The behavior and decision-making process of firms in a variety of market structures. New approaches in the theory of the firm. 4 seminars. Prerequisites: Graduate standing; for non-economics students only.

EC 530 Advanced Seminar in Environmental Economics (4)

Advanced topics in environmental economic analysis. Theory of market failure and externalities in pollution of common property. Benefit-cost, cost effectiveness, impact analysis, and other applied quantitative methods of environmental valuation. Air, water, and hazardous waste policy alternatives. International pollution control and assessment. 4 seminars. Prerequisites: EC 401 and EC 406; or graduate standing. Unconditional standing required.

EC 531 Advanced Seminar in Natural Resource Economics (4)

Advanced topics in resource economic analysis. Theories of renewable vs exhaustible resource usage. Policy efforts to guide optimal utilization of resources. Multiple use, intertemporal consistency issues in resource management. Quantitative models of resource demand, supply and scarcity. International natural resource policies. 4 seminars. Prerequisites: EC 401 and EC 406; or graduate standing. Unconditional standing required.

EC 550 Microeconomic Analysis (4)

Analysis of the resources allocation systems and behavior of producing and consuming units. 4 lecture discussions. Prerequisites: Elementary calculus and linear algebra (equivalent to EC 406) and EC 401 and EC 402 or equivalent; or graduate standing. Unconditional standing required.

EC 551 Macroeconomic Analysis (4)

Analysis of aggregate national economic activities. 4 lecture discussions. Prerequisites: Elementary calculus and linear algebra (equivalent to EC 406), EC 403, and EC 408 or equivalent; or graduate standing. Unconditional standing required.

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. 4 lecture/discussions. Prerequisites: Calculus, matrix algebra, EC 401, EC 402, EC 403, EC 322/322A or equivalent; or graduate standing. Unconditional standing required.

EC 560 Managerial Economics and Operations Analysis (4)

Advanced topics and new developments in managerial economics and operations research. 4 lecture discussions. Prerequisites: EC 401, MAT 125, and EC 322 or equivalent; or graduate standing. Unconditional standing required.

EC 654 Economics of International Finance (4)

Advanced topics in international liquidity and finance theory. Problems of international monetary system. Balance of payments theory and practices; theory of exchange rates and mechanism of international adjustment. 4 lecture discussions. Prerequisites: EC 401, EC 403, EC 408, and EC 405; or graduate standing. Unconditional standing required.

EC 655 Economics of International Trade (4)

Advanced topics in international trade. Theory of exchange; tariffs and other trade barriers. Problems of international competition and cooperation. 4 lecture discussions. Prerequisites: EC 401, EC 403 and EC 404; or graduate standing. Unconditional standing required.

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. 4 lecture discussions. Prerequisites: EC 408, EC 401 and EC 403; or graduate standing. Unconditional standing required. Prerequisite for EC 657: Graduate Standing.

EC 659 Seminar in Transportation Economics (4)

Demand and supply of transportation; transport cost and price analysis; transportation regulation—past, present, and proposed. Economic aspects and evaluation of public and private modes of transportation—domestic and international. Economic analysis of future directions for transportation systems. 4 seminars. Prerequisites: EC 550 or consent of instructor; or graduate standing. Unconditional standing required

EC 660 Public Finance (4)

Government taxation and expenditure. The fiscal decision process and fiscal choice theory. Government budgeting and cost benefit analysis. 4 lecture discussions. Prerequisite: consent of instructor; or graduate standing. Unconditional standing required.

EC 665 Economic Development (4)

Advanced topics in economic development. Historical analysis of causes and consequences of economic development. Special attention to the problems of developing and underdeveloped nations. 4 lecture discussions. Prerequisite: EC 411 or equivalent; or graduate standing. Unconditional standing required.

EC 666 Economic Planning (4)

Public policies, principles, and standards of taxation and expenditures, budgeting, public goods, income redistribution, regulation, and development. Examine the equity and efficiency of public policy and assess the fiscal impact. 4 hours lecture/discussion. Prerequisites: PLS 314, PLS 416; or graduate standing.

EC 691 Directed Study (1–4)

Independent study in an area chosen by the student under the supervision and direction of a graduate faculty member. Maximum credit, 6 units. Unconditional standing required, or graduate standing.

EC 696 Master's Degree Thesis (1–3)

Independent research and study under the supervision of the faculty. Reporting the research results in the approved form. Maximum credit, 5 units. Advancement to Candidacy required, or graduate standing.

EC 697 Comprehensive Examination (1)

Preparation for and completion of the written comprehensive examination. May be taken no more than two times. Failure to complete the exam satisfactorily the second time will result in termination from the program. Advancement to Candidacy required, or graduate standing. CR/NC.

EC 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Advancement to candidacy is required, or graduate standing. This course is graded on a mandatory credit/no credit basis.

ENGLISH

Master of Arts in English

In the Department of English and Foreign Languages, College of Letters, Arts, and Social Sciences

www.class.csupomona.edu/efl

Liliane Fucaloro, Chair
Karen A. Russikoff, Graduate Coordinator

The program leading to the Master of Arts in English features a broad-based curriculum that offers three subplans: (1) Literature; (2) Rhetoric/Composition; and (3) Teaching English as a Second Language. Within a 45 (or 49) quarter-unit degree requirement, students, working with their advisors, tailor their course of study to their own interests and needs. The primary objective of the Literature concentration is to deepen the student's understanding of literary texts through close analysis and through related readings in theory and culture. It also provides useful preparation for the teaching of literature in high school and community college, as well as for entry into a doctoral program. The Rhetoric and Composition concentration offers training for graduate students in the teaching of writing at all levels of the educational system. The concentration in Teaching of English as a Second Language provides refined technical expertise in this discipline, enabling the student to perform valuable service in school and community upon completion of the degree program. The English M.A. program prepares students to become English teachers in high schools and community colleges or to proceed directly to doctoral studies; it also offers the opportunity for students to engage in sustained pursuit of advanced study within the discipline of English.

ADMISSION TO THE PROGRAM

In order to be admitted as an unconditional student in the Master of Arts program in English, the applicant must have successfully completed an undergraduate program of study in all major periods of English and American literature, as well as in critical theory and in the English language. Deficiencies in any of these areas will be made up by course work; at the discretion of the chair of the departmental graduate committee, a portion of such work may count toward the 45 (or 49) units required for the degree. The student's grade point average in the upper-division English courses of his/her undergraduate program must be at least 3.0 (B). A student who does not meet these requirements may request special consideration for admission as a conditional student. Removal of conditional status will require the completion of at least 12 quarter units of graduate work in English, in residence, with an average of B (3.0). No grade below C (2.0) will be accepted.

The Master's in English Program requires a minimum score of 7 on International English Language Testing System (IELTS), and a minimum score of 100 on the International-Based TOEFL.

REQUIREMENTS AND CURRICULUM

1. Advancement to Candidacy

   Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is granted, with the recommendation of the graduate faculty, when the student has completed all preparatory course work. Advancement to Candidacy is a prerequisite for the culminating experience of the comprehensive examination or thesis.

   The Graduation Writing Test (GWT) must have been passed prior to Advancement to Candidacy. If the GWT is not taken the quarter following the completion of 8 units in the English M.S. program, a hold will be placed on the student's registration.

2. Course Work

   A grade point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and all graduate courses.

   No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.

   A total limit of 13 transfer, Extended University units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.

   The candidate must be enrolled in the university during the quarter of graduation.

The student will complete 45 (or 49 if Literature is primary and TESL is secondary) units as follows:

I. REQUIRED COURSES FOR ALL SUBPLANS (5–8 UNITS)

Introduction to Graduate Research	ENG	500	(4)
Master's Degree Thesis	ENG	696	(4)
or Comprehensive Examination	ENG	697	(1)
Total			(5-8)

II. REQUIRED COURSES WITHIN SUBPLANS (16–24 UNITS)

Three concentrations available:

1) Literature (20 units if primary concentration, 16 if secondary)

2) Rhetoric and Composition (16 units)

3) Teaching of English as a Second Language (24 units)

Literature Subplan (16–20 units)

The student must choose two of the following three sequences (16 units). In sequences A and B, study is to be continuous by chronological period (e.g., ENG 551a/ENG 552a, NOT ENG 551a/ENG 552c).

A. Studies in English Literature	ENG	551, 552	(4,4)
a. to 1500			
b. 1500-1660			
c. 1660-1800			
d. 19th Century			
e. 20th Century			
B. Studies in American Literature	ENG	561, 562	(4,4)
a. to 1800			
b. 19th Century			
c. 20th Century			
C. Studies in World Literature	ENG	541,542	(4,4)

One course selected from either of the following groups (4 units):

D. Contemporary Literary Theory	ENG	570	(4)
Studies in Fiction	ENG	571,572	(4,4)
Studies in Drama	ENG	573,574	(4,4)
Studies in Poetry	ENG	575,576	(4,4)
Pedagogy of Drama	ENG	590	(4)
E. Teaching ESL Composition	ENG	525	(4)
Teaching High School Composition	ENG	586	(4)
Teaching Basic Writing	ENG	587	(4)
Teaching College Freshman Composition	ENG	588	(4)

Rhetoric and Composition Subplan (16 units)

Three courses (12 units) selected from the following:

History of Rhetoric	ENG	581	(4)
Rhetoric and Poetics	ENG	582	(4)
Composition Theory	ENG	583	(4)
Theory and Practice of Modern Rhetoric	ENG	584	(4)
Special Topics in Rhetoric and Composition	ENG	585	(4)
Pedagogies of Reading	ENG	589	(4)

One course selected from the following (4 units):

Teaching High School Composition	ENG	586	(4)
Teaching Basic Writing	ENG	587	(4)
Teaching College Freshman Composition	ENG	588	(4)

Teaching English as a Second Language Subplan (24 units)

Introduction to Teaching English as a

Second Language	ENG	521	(4)
Second Language Acquisition	ENG	522	(4)
Grammar for Teachers of ESL	ENG	523	(4)
Principles of Accent Reduction in TESL	ENG	524	(4)
Teaching ESL Composition	ENG	525	(4)
Practicum in TESL	ENG	526/526A	(3/1)

III. ELECTIVE COURSES (13–24 units)

(Contingent upon choice of concentration[s] and/or thesis)

These may include electives listed under any of the concentrations above, and any of the following:

Ethnic Literatures of the United States	ENG	531,532	(4,4)
Special Topics	ENG	550	(4)
Contemporary Literary Theory	ENG	570	(4)
The Contemporary American Novel	ENG	577	(4)
Pedagogies of Dramatic Literature	ENG	590	(4)
Directed Study	ENG	691	1-4
Teaching Associate Practicum	ENG	692	1

In consultation with their advisor, students may take a maximum of 8 upper-division or graduate units in fields related to English—chiefly philosophy, history, drama, communication arts, history of art, and teacher preparation.

GRADUATE COURSE DESCRIPTIONS

ENG 500 Introduction to Graduate Research (4)

Principles and techniques used in scholarly and critical writing; bibliographical sources and methods, including on-line research. Emphasis may be placed on specialized subjects, such as literature period or genre, rhetoric and composition, teaching English as a Second Language. Must be completed in first two years. 4 seminars.

ENG 521 Introduction to Teaching English as a Second Language (4)

Overview of TESL terminology, historical perspectives, methodologies, socio-political aspects of language and language-teaching profession, and TESL research tools, including elements of qualitative and quantitative design. Readings, discussions, computer applications, and research. 4 seminars.

ENG 522 Second Language Acquisition (4)

Survey of the current research and literature on second-language acquisition. Attention will be given to research methodology in second-language acquisition and to current theories in SLA. 4 seminars.

ENG 523 Grammar for Teachers of English as a Second Language (4)

Survey of aspects of English grammar most troublesome for non-native speakers of English. 4 seminars.

ENG 524 American English Pronunciation for ESL Teachers (4)

Features of the English sound system that are important in achieving accurate pronunciation. Emphasis on consonant and vowel articulation, intonation, stress, consonant clusters, contextual alterations, and speech rhythm. 4 seminars.

ENG 525 Teaching ESL Composition (4)

Topics in pedagogical and theoretical perspectives. Methods for helping non-native, English-speaking students master the requirements of basic and academic written English. Strategies for integrating recent research on second-language composing into a course or curriculum in ESL composition. 4 seminars.

ENG 526/526A Practicum in Teaching English as a Second Language (3/1)

Emphasis on curriculum analysis, textbook and material selection, lesson preparation, assessment issues, professional development, and classroom teaching practice. TESL program administration also considered. 3 seminars; 1 two-hour activity.

ENG 531, 532 Ethnic Literatures of the United States (4) (4)

Selected authors and topics. In the first quarter, extensive reading and comparative analysis. In the second, selected authors and topics in one of the following: (A) African-American Literature, (B) Asian-American Literature, (C) Mexican-American Literature, (D) Native-American Literature. ENG 532 may be repeated with different content for up to 12 units of credit. 4 seminars.

ENG 541, 542 Studies in World Literature (4) (4)

Selected authors and topics in world literature, including major works and movements in the European and non-European traditions. In the first quarter, extensive reading. In the second, intensive study of individual authors, genres, movements, or topics included in the first quarter. ENG 542 may be repeated with different content for up to 12 units. 4 seminars.

ENG 550 Special Topics (4)

Topics in advanced areas of language or literature. May be repeated for a total of 12 units. 4 seminars. Prerequisite: consent of instructor.

ENG 551, 552 Studies in English Literature (4) (4)

Selected authors and topics in one of the following periods: (A) to 1500, (B) 1500-1660, (C) 1660-1800, (D) 19th century, (E) 20th century. In the first quarter, extensive reading. In the second, intensive study of individual authors or topics included in the first quarter. Substantial paper at the end of each quarter. Enrollment in the second quarter by consent of the instructor. May be repeated with different content for up to 12 units each. 4 seminars.

ENG 561, 562 Studies in American Literature (4) (4)

Selected authors and topics in one of the following: (A) to 1800, (B) 19th century, (C) 20th century. In the first quarter, extensive reading. In the

second, intensive study of individual authors or topics included in the first quarter. Substantial paper at the end of each quarter. Enrollment in the second quarter by consent of the instructor. May be repeated with different content for up to 12 units each. 4 seminars.

ENG 570 Contemporary Literary Theory (4)

Important ideas in contemporary theory, focusing on such theorists as Bakhtin, Barthes, Derrida, Kristeva, Lacan, Fish, Lukacs, de Lauretis. 4 seminars.

ENG 571, 572 Studies in Fiction (4) (4)

Selected authors and topics. In the first quarter, extensive reading. In the second, intensive study of individual authors or topics included in the first quarter. Substantial paper at the end of each quarter. 4 seminars.

ENG 573, 574 Studies in Drama (4) (4)

Selected authors and topics. In the first quarter, extensive reading. In the second, intensive study of individual authors or topics included in the first quarter. Substantial paper at the end of each quarter. 4 seminars.

ENG 575, 576 Studies in Poetry (4) (4)

Selected authors and topics. In the first quarter, extensive reading. In the second, intensive study of individual authors or topics included in the first quarter. Substantial paper at the end of each quarter. 4 seminars.

ENG 577 The Contemporary American Novel (4)

Structure and theme in the American novel since 1945. Such writers as Bellow, Malamud, Morrison, Updike, Walker, Erdrich. 4 seminars.

ENG 581 History of Rhetoric (4)

History of rhetoric from pre-classical times through the 18th century; the interplay of theory and practice in this history. 4 seminars.

ENG 582 Rhetoric and Poetics (4)

Examination of converging theories and practices focused on the rhetorical nature of literature and literary study: emphasis on providing future rhetoricians and teachers with a coherent understanding of the relations between rhetorical and literary disciplines. 4 seminars.

ENG 583 Composition Theory (4)

Major theories of the composing process and analysis of the research on which they are based. 4 seminars.

ENG 584 Theory and Practice of Modern Rhetoric (4)

Readings in rhetorical theory since the 18th century, with reference to its relevance in public written discourse and composition pedagogy. 4 seminars.

ENG 585 Special Topics in Rhetoric and Composition (4)

Intensive study of a topic or figure of special interest to advanced students. May be repeated once for credit with a different content. 4 seminars.

ENG 586 Teaching High School Composition (4)

Topics in pedagogical and theoretical perspectives. Methods for helping students to master the writing process. Strategies for integrating recent research on composing into a course or curriculum in composition. 4 seminars.

ENG 587 Teaching Basic Writing (4)

Topics in pedagogical and theoretical perspectives. Methods for helping basic writing students to master the writing process. Strategies for integrating recent research on composing into a course or curriculum in composition in basic writing. 4 seminars.

ENG 588 Teaching Freshman Composition (4)

Topics in pedagogical and theoretical perspectives. Methods for helping students to master the writing process. Strategies for integrating recent research on composing into a course or curriculum in composition. 4 seminars.

ENG 589 Pedagogies of Reading (4)

Developmental, historical, and theoretical approaches to reading. 4 seminars. Prerequisite: consent of instructor.

ENG 590 Pedagogies of Dramatic Literature (4)

Theory, research, and practice in using performance approaches for teaching plays to students at high school and college levels. These techniques will be presented in combination with the use of writing for discovery. 4 seminars.

ENG 599/599A Special Topics for Graduate Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 4 units, with a maximum of 2 units per quarter. Instruction is by lecture, laboratory, or a combination. Prerequisite: permission of instructor. Corequisites may be required.

ENG 691 Directed Study (1–4)

Independent investigation of selected topics in English under the direction of a graduate faculty member. Students must register through the office of the graduate coordinator in English. Unconditional standing required. No more than four units of directed study in total, whether undertaken with one or more instructors, may count as units in a student's graduate program.

ENG 692 Teaching Associate Practicum (1)

Practicum for Teaching Associates. Readings, discussions, supervised classroom teaching. Prerequisite: Teaching Associate appointment, unconditional standing required. 1 seminar/discussion. May be repeated twice.

ENG 696 Master's Degree Thesis (4)

An analytical study, using critical sources and/or literary theory, on a topic chosen by the student in consultation with the graduate coordinator in English. The student undertakes this study, under the direction of a thesis committee, as the culminating project of the graduate program. Advancement to Candidacy required.

ENG 697 Comprehensive Examination (1) (Credit/No Credit)

An examination on areas of special concentration in English as determined by the student in consultation with the graduate coordinator in English and other graduate faculty. May be taken no more than two times. Failure to complete exam satisfactorily the second time will result in termination from the program. Students must register through the office of the graduate coordinator in English. Advancement to Candidacy required.

ENG 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Students must obtain a permission number from the Department to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

HISTORY

Master of Arts in History

In the Department of History, College of Letters, Arts and Social Sciences

www.class.csupomona.edu/his/history.htm

Daniel K. Lewis, Chair
Mahmood Ibrahim, Graduate Coordinator

The Master of Arts in History is designed for K-12 teachers who would like to pursue professional development and enhance their academic content knowledge, those who wish to prepare for the Ph.D. degree, and those who want to teach at the community college level.

GENERAL PROGRAM REQUIREMENTS

The degree requirements consist of:

1. A minimum of 25 units of 500 or 600 level courses
2. A maximum of 20 units of 300 and 400 level courses (12 units in History, 8 units in social science or humanities. Teachers and potential teachers are encouraged to enroll in GED 550, GED 650, and or GED 690).
3. Total: at least 45 quarter units of course work.
4. An option of either Comprehensive Examinations or a Master's Thesis.

ADMISSION REQUIREMENTS

1. The applicant must hold a B.A. degree in either history or in one of the social sciences, humanities, or fine arts disciplines from an accredited college or university.
2. The applicant must have achieved a grade point average of at least 3.00 in history, social science, fine arts, and humanities course work;
3. The applicant must submit an essay (about one page)with the application explaining why he/she wishes to pursue a graduate degree and describing his/her post-baccalaureate work experience and plans for the future;
4. The applicant must submit three letters of recommendation from professors, or supervisors. (In the case of K-12 teachers, his/her principal and two colleagues);
5. The applicant must receive a positive recommendation from the Department of History Director of the Graduate Program and the Department of History Graduate Committee.

Conditional admission is granted to applicants in cases where criteria (1) and (2) are not satisfied. The applicant then may demonstrate an aptitude for graduate study either by submitting test scores of the Graduate Record Examination (GRE), including the achievement test in history, or by submitting letters of recommendation and other relevant documents indicating that preparation for graduate study in history was achieved in other ways. Additional courses in history may be required, which may lengthen the time of degree completion.

The preferred method of application is electronically at: www.csumentor.edu but students may also obtain hard copy applications from the Admissions Office on the second floor of the CLA building.

Please note that the application and academic transcripts should be sent to the Graduate Admissions Office, while the essay, GRE scores, and the letters of recommendation should be sent directly to the Department of History.

GRADUATE GUIDELINES

ADVISING: By 12 units, all graduate students must choose a principal faculty advisor. Within 24 units, all graduate students must form a graduate committee with two additional faculty members. For a list and description of departmental faculty, go to: www.class.csupomona.edu/his/faculty.htm

PLAN FOR DEGREE COMPLETION: By 12 units, all graduate students must declare, to their principal advisor, their intention to either take a MA comprehensive exam or write a Master's Thesis to complete the degree.

MASTER'S THESIS: By 12 units, students intending to write a MA thesis must submit, to their principal advisor, a 200-300 word prospectus summarizing their intended topic of study and receive consent of the advisor to proceed with the topic. By the completion of 24 units, the student must acquire the signatures of 2 additional faculty members who agree to serve on the student's committee.

MASTER'S EXAM: By 12 units, students intending to take the Master's Exam must indicate, to their principal advisor, their preference between the United States Track Exam and the World History Track Exam. Students taking the United States Track will take a comprehensive United States history exam and a Special Interest Topics exam. Students taking the World History Track will take one World History exam (either Ancient/Medieval or Medieval/Modern) and one Special Interest Topics exam. Special Interest Topics will be developed in consultation with the student's principal advisor. By 24 units, students must have two additional faculty members agree to serve on a committee to offer advice and to assess the exams.

Students taking the exam are expected to do so in their final quarter and to notify their principal advisor in the first week of their final quarter that they will be taking the exam.

PROGRESS TOWARD DEGREE: Students are expected to demonstrate consistent progress toward their degree. The Master's Degree is designed to be completed in 2 years for a full-time student, and proportionately more for part-time students or those who must complete additional course work.

GRADUATE COURSE DESCRIPTIONS

HST 501 Advanced Methods (4)

Advanced historical research methods, including use of electronic databases and internet resources. Interpretation and contextualization of primary source materials as well as annotation of secondary sources. Term papers, in-class presentations, and panels. 4 seminars. Required for all graduate students in History who did not take the equivalent of Cal Poly Pomona's HST 300.

HST 510 Teaching History (4)

Investigation and evaluation of teaching and assessment methods in high school or college classrooms. Includes internship or mentoring experience in teaching and classroom preparation. Prerequisite: graduate standing.

HST 540 Readings in Ancient World History (4)

In-depth study and analysis of common themes, issues, and documents in ancient civilizations. 4 seminars. Prerequisite: HST 501 or equivalent, or permission of instructor.

HST 541 Readings in the Middle Period of World History (4)

In-depth study and analysis of common themes, issues, and documents in medieval world civilizations. 4 seminars. Prerequisite: HST 501 or equivalent, or permission of instructor.

HST 542 Readings in Modern World History (4)

In-depth study and analysis of common themes, issues, and documents in modern world civilizations. 4 seminars. Prerequisite: HST 501 or equivalent, or permission of instructor.

HST 560 Readings in Early U.S. History (4)

In-depth graduate study and analysis of major themes, problems, and trends in U.S. history from Colonial times to 1877. 4 seminars. Prerequisite: Admittance to History Master of Arts Degree program

HST 561 Readings in Modern U.S. History (4)

In-depth graduate study and analysis of major themes, problems, and trends in U.S. history from 1877 to present. 4 seminars. Prerequisite: Admittance to History Master of Arts degree program.

HST 562 Readings in California History (4)

Graduate level study and analysis of major themes and controversies in the history of California from the Spanish era through the present. 4 hours seminar. Prerequisite: HST 501 or permission of instructor.

HST 570 Contemporary Historiography (4)

Close reading and analysis of recent trends in historiography—feminist and gender theory, cultural studies, post-colonial studies, narratology, and post-modern and post-structuralist approaches to history. 4 seminars. Prerequisite: HST 501 or equivalent, or permission of instructor.

HST 600 Independent Study (2)

Independent study of a particular subject under faculty supervision. May be repeated once. Must be taken as Credit/No credit.

HST 650 Seminar in Theories of World History (4)

Analysis of theories of universal, comparative, and world history, especially the "world systems" theories of Braudel, Wallerstein, Abu-Lughud, Gunder Frank and their critics. Alternative approaches to the problem of world history. 4 seminars. Prerequisite: HST 501 or equivalent, or permission of instructor.

HST 691 Seminar in History Topics (4)

Focus on selected areas of current interest (World or U. S., depending on instructor). May be repeated once for credit when different content is offered. 4 seminars. Prerequisite: HST 501 or equivalent, or permission of instructor.

HST 696 Master's Thesis (5)

Research and writing the MA thesis under faculty supervision. Directed research.

HST 697 Comprehensive Exam Preparation (1)

Individual study for the comprehensive examination. May be repeated two times for credit.

HST 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

KINESIOLOGY AND HEALTH PROMOTION

Master of Science in Kinesiology

In the Department of Kinesiology and Health Promotion, College of Letters, Arts, and Social Sciences

www.class.csupomona.edu/khp/

Perky Vetter, Chair and Graduate Coordinator

Kristine Brown
Laura Chase
Ken Hansen
Hyun Gu Kang
Andrea Metzker
Moustafa Moustafa
Jeff Nessler
Tom Spalding

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

A candidate for the Master of Science in Kinesiology will be required to choose among three areas of specialization: Adapted Physical Education; Curriculum and Instruction; Exercise Physiology.

The Adapted Physical Education Specialization is directed toward those interested in working with persons with special needs. It combines practical experience with theoretical knowledge of individuals with disabilities. Students in this specialization must complete either a thesis or a comprehensive examination.

The Curriculum and Instruction Specialization focuses on methodology, curriculum development, preparation for college teaching, and evaluation with practical implementation. Students in this specialization must complete either a thesis or a comprehensive examination.

The Exercise Physiology Specialization offers a varied theoretical base including the influence of physical activity on public health issues along with clinical experience in the assessment of human performance. Objectives of the program include the preparation of students for research positions and advanced graduate programs or for careers in the exercise science area such as health fitness specialists and counselors. Students in this specialization must complete a thesis.

All KHP graduate students, regardless of their specialization, have the opportunity to select elective courses from within the department as well as from other graduate programs within the university.

The Sports Nutrition subplan, an interdisciplinary program, is offered by the Department of Kinesiology and Health Promotion. Refer to "Sports Nutrition Subplan."

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 student with a baccalaureate degree in a major other than physical education may be admitted subject to review of the student's academic background, performance and interests by the Graduate Coordinator.

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 KHP Graduate Coordinator. If the Coordinator approves, the applicant 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 KIN 590, Research Methods, with a grade of B or better.

Each graduate student will select an advisor from the KHP graduate faculty. This should be based upon the student's area of specialization and the thesis topic so that the advisor's expertise will coincide with the student's academic emphasis. The student, with an advisor, will develop a program based on the individual's interests and preparation. This program (also referred to as a "contract") will include required core courses, area of specialization courses, and appropriate elective courses. All programs will be reviewed and approved by the student's advisor, the Graduate Coordinator, and the Graduate Studies Analyst.

REQUIREMENTS

1. The degree program must include a minimum of 45 quarter units. 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. Six units of required core courses and 9-11 units in an area of specialization must be included.
2. Students must take a minimum of 6 units outside their chosen area of specialization and still in the KHP Department.
3. No more than 13 units of acceptable graduate credit may be transferred from another institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total of not more than 13 transfer, Extended University, or units petitioned for graduate credit may be included in a master's contract. The stipulated time limit of 7 years applies to all of the above.
4. Advancement to Candidacy is granted upon the recommendation of the graduate coordinator and implies a readiness of the candidate to fulfill the terminal requirement of either a thesis or a comprehensive examination. The Graduation Writing Test (GWT) must have been passed prior to Advancement to Candidacy.
5. The student shall indicate at the time of filing the program the decision as to the manner of fulfilling the terminal requirement. The candidate who chooses to write a thesis must enroll for 9 units of thesis credit. Prior to beginning the collection of data, the candidate must make a formal presentation of the thesis proposal to the thesis committee and receive its approval. Upon completion of the thesis, the candidate must make an oral presentation of the thesis to the KHP graduate faculty. The candidate adopting the option of a comprehensive examination will be tested on material from the core and specialization areas.
6. The candidate must be enrolled in the university during the quarter of graduation.

CURRICULUM

REQUIRED COURSES

Research Methods	KIN	590	(3)

Option I:

Research Design	KIN	591	(3)
Maser's Degree Project	KIN	695	(9)
or Master's Degree Thesis	KIN	696	(9)

Option II:

Comprehensive Examination	KIN	697	(1)

SPECIALIZATION AREAS

Adapted Physical Education

Motor Assessment for Individuals with Disabilities . . . . . KIN 401/401A, KIN 401S/401AS (3/1)
Physical Education for Physically and Health Impaired . . . . . KIN 406/406A, KIN 406S/406AS (3/1)
Physical Education for Individuals with Severe Disabilities . . . . . KIN 410/410A, KIN 410S/410AS (3/1)

Curriculum Development in Physical Education	KIN	553	(3)
Instructional Strategies in Physical Education	KIN	559	(3)
Management of Adapted Physical Education Programs	KIN	570	(3)

Motor Practicum for Individuals with Disabilities KIN/575A, KIN 575S/575AS (3/1)

Curriculum and Instruction

Curriculum Development in Physical Education	KIN	553	(3)
Evaluating Teacher Effectiveness in Physical Education	KIN	555	(3)
Instructional Strategies in Physical Education	KIN	559	(3)

Exercise Physiology

Sports Medicine	KIN	455	(4)
Advanced Physiology of Exercise	KIN	683/683L	(3/1)
Advanced Concepts in Exercise Testing and Counseling	KIN	684	(3)

ELECTIVES

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

A list of electives, which includes upper-division and graduate courses in related disciplines is available from the department's Graduate Coordinator.

GRADUATE COURSE DESCRIPTIONS

KIN 510 Philosophical Bases of Sport and Physical Education (3)

The development of the philosophies of physical education and the assumptions upon which current professional philosophies rest. 3 lecture discussions.

KIN 540 Sociology of Sport 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 institutions of politics and education; sport as it affects one's sociocultural development and value system. 3 lecture discussions.

KIN 543 Sport History (3)

Development of sport in Western civilization; emphasis on political, religious and social influences and their effect on American sport. 3 lecture discussions. Prerequisite: graduate standing.

KIN 545 International Physical Education and Sport (3)

Examination and analysis of similarities and differences of physical activities in developed and developing countries. Cultural, educational, and historical backgrounds of contemporary physical education and sport programs. 3 seminars.

KIN 548 Sport Psychology (3)

Personal characteristics of athletes and coaches. Characteristics of various sports environs in relation to athletic participation, performance, and learning. 3 hours lecture/discussion.

KIN 553 Curriculum Development in Physical Education (3)

Basic considerations and issues of standards-based physical education curricula in the K-12 schools. Focus on essential national and state standards, components, development, implementation, management, and assessment of widely used curricula in physical education. 3 hours lecture/discussion. Perequisite: Graduate standing or permission of instructor.

KIN 555 Evaluating Teacher Effectiveness in Physical Education (3)

Strategies and procedures used for evaluating and implementing on-site teacher effectiveness. 3 seminars.

KIN 559 Instructional Strategies in Physical Education (3)

Strategies for improving instruction, interpersonal-interaction skills, instruments for measuring teaching outcomes and research studies on teacher effectiveness. 3 seminars. Prerequisite: KIN 553 or permission of instructor.

KIN 570 Management of Adapted Physical Education Programs (3)

Teacher training approaches, technology, in-service presentations, professional development, service delivery models, legislation, due process procedures, transition, consultation and collaboration skills needed by adapted physical education teachers in managing their program. 3 hours lecture/discussion. Prerequisite: Graduate standing or permission of instructor.

KIN 575/575A, KIN 575S/575AS Motor Practicum for Individuals with Disabilities (2/1)

Supervised clinical and integrated experiences in adapted physical education. May be taken a maximum of 3 times for credit. 2 hours lecture/problem-solving; 2 hours fieldwork. Corequisites: KIN 575/575A. Prerequisite: KIN 206/206A, KIN 206S/206AS or graduate standing.

KIN 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. 3 seminars. Prerequisite: KIN 430/430L.

KIN 583 Advanced Motor Development (3)

Preparation and presentation of critical reviews dealing with physical growth and motor development throughout life. Changes in anthropometric measurements, rates of growth of various body tissues, organs and segments, and ossification of the skeleton from infancy to adulthood. 3 seminars. Prerequisite: KIN 312/312A.

KIN 590 Research Methods (3)

Study the nature of research and the various methods for acquiring information relevant to the profession. 3 lecture discussions.

KIN 591 Research Design (3)

Examine the nature and role of applying and interpreting statistical techniques for specific problems related to our professional field. 3 seminars. Prerequisite: KIN 590.

KIN 670 Issues in Adapted Physical Education (3)

Study of current trends and issues in adapted physical education as influenced by special education legislation. 3 seminars. Prerequisite: KIN 206/206A, KIN 206S/206AS or graduate standing. Unconditional standing required.

KIN 680 Kinesiological Analysis (3)

Advanced study of human movement in sport, exercise, and daily living using biomechanical principles and human functional anatomy. 3 hours lecture/discussion. Prerequisite: KIN 302 and unconditional status as graduate student.

KIN 683/683L Advanced Physiology of Exercise (3/1)

The physiological and biochemical adjustments made by the body during exercise and changes which result from prolonged periods of intensive physical training. 3 seminars, 2 one-hour laboratories. Prerequisite: KIN 303/303L. Unconditional standing required.

KIN 684 Advanced Concepts in Exercise Testing and Counseling (3)

Advanced concepts of graded exercise testing (GXT), interpretation, and counseling. GXT preparation, administration, and evaluation. Modes and purposes of GXT, exercise electrocardiography, energy cost calculations, and principles of exercise prescription. Special considerations for select population groups and case study preparation. 3 lectures/problem-solving. Prerequisite: KIN 683/683L. Unconditional standing required.

KIN 685/FN 685 Nutrition in Sports and Exercise (4)

Knowledge concerning the role of nutrients in optimizing human performance. Assessment of caloric and nutrient requirements associated with exercise. Special consideration is given to gender specific needs of athletes, nutritional ergogenic aids, and eating disorders. 4 seminars. Prerequisites: KIN 683/683L and FN 533. Unconditional standing required.

KIN 691 Directed Study (2)

A thorough investigation and research of a theme or subject selected by the student in consultation with the faculty. The scholarly research should be undertaken by the initiative of the student but with general guidance and advice from the faculty. Maximum credit 4 units. Unconditional standing required.

KIN 695 Master's Degree Project (3)

Independent scholarship leading to successful completion of a project. Evidence of originality and independent thinking, appropriare form and organization, and a rationale. Open to all graduate candidates in the Adapted Physical Education and Curriculum & Instruction specializations. May be taken for a maximum of 9 units. Prerequisite: KIN 590 and KIN 591. Advancement to candidacy required.

KIN 696 Master's Degree Thesis (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/her mastery of the principles of the profession. May be scheduled for a maximum of 9 units. Prerequisite: KIN 591, except Sport History. Advancement to Candidacy required.

KIN 697 Comprehensive Examination (1)

Preparation for and completion of the written comprehensive examination for students in lieu of thesis. May be taken no more than two times. Failure to complete exam satisfactorily the second time will result in termination from the program. Advancement to Candidacy required.

KIN 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Approval of faculty advisor is required and student must obtain a permission number from the Department to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

MASTER OF SCIENCE IN KINESIOLOGY

Sports Nutrition Subplan

www.class.csupomona.edu/khp/

Michael Liong, Graduate Coordinator, Department of Kinesiology and Health Promotion

The Sports Nutrition graduate study subplan is an interdisciplinary program offered jointly by the Kinesiology and Health Promotion Department. It is designated for students interested in pursuing graduate work which integrates nutrition science and human performance.

The curriculum has been developed to provide an advanced understanding of nutrition science and exercise physiology and to facilitate the pursuit of a variety of careers in clinical and/or applied settings. The curriculum consists of two parts: a required core area and a restricted electives area. Students can choose courses from the elective area in accordance with their particular interest and goals. Students are expected to meet all of the prerequisites for the core courses.

ADMISSION TO THE PROGRAM

An applicant for admission to the program must have received a baccalaureate degree in kinesiology or foods and nutrition or a related discipline from an accredited institution. A student with a baccalaureate degree in a major other than kinesiology or foods and nutrition may be admitted subject to review of the student's performance and academic background by the graduate coordinators of the respective departments. The student must file complete application forms, three letters of recommendation, a statement of purpose, and official transcripts from all colleges and/or universities attended.

CURRICULUM

REQUIRED CORE (19–21 units required)

Research Methods	KIN	590	(3)
Statistics for Agriculture	ABM	575	(4)
or Research Design	KIN	591	(3)
Advanced Nutrition	FN	533	(3)
Physiology of Exercise/Laboratory	KIN	683/683L	(3/1)
Advanced Exercise Testing and Counseling	KIN	684	(3)
Nutrition in Sports and Exercise	FN/KIN	685	(4)

RESTRICTED ELECTIVES (15–20 units required)

Advanced Nutrient Metabolism I	FN	433	(4)
Advanced Nutrient Metabolism II	FN	434	(4)
Advanced Nutrient Metabolism III	FN	435	(4)
Sports Medicine	KIN	455	(4)
Exercise Metabolism and Weight Control	KIN	456	(3)
Recent Advances in Nutrient Metabolism	FN	535	(3)

(may be repeated for credit)

Seminar	FN	570	(2-4)
Immunology-Serology/Laboratory	MIC	415/415L	(3/2)
Hematology	MIC	444/444L	(3/1)
Endocrinology	BIO	520/520L	(3/1)
Cellular Immunity and Disease	BIO	570/570L	(3/1)
Advanced Topics in Biology (as pertinent and with approval)	BIO	575	(2)
Bioethics	PHL	433	(4)
Theories of Counseling	PSY	412	(4)

TERMINAL REQUIREMENT

Thesis	KIN/FN	696	(6-9)

Core courses must be completed and student must be Advanced to Candidacy prior to enrolling in thesis.

Total units required . . . . . (45)

GRADUATE COURSE DESCRIPTIONS

See Biological Sciences, Philosophy, and Psychology for other course descriptions.

KIN 590 Research Methods (3)

Study the nature of research and the various methods for acquiring information relevant to the profession. 3 lecture discussions.

KIN 591 Research Design (3)

Examine the nature and role of applying and interpreting statistical techniques for specific problems related to our professional field. 3 seminars. Prerequisite: KIN 590.

ABM 575 Statistics for Agriculture (4)

A summary of statistical tools and techniques used in agriculture. Application of computer to selected statistical techniques. 4 lecture discussions.

KIN 683/683L Advanced Physiology of Exercise (3/1)

The physiological and biochemical adjustments made by the body during exercise and changes which result from prolonged periods of intensive physical training. 3 seminar/discussion. 1 two-hour laboratory. Prerequisite: KIN 303/303L.

KIN 684 Advanced Concepts in Exercise Testing and Counseling (3)

Advanced concepts of graded exercise testing (GXT), interpretation, and counseling. GXT preparation, administration, and evaluation. Modes and purposes of GXT, exercise electrocardiography, energy cost calculation, and principles of exercise prescription. Special considerations for select population groups and case study preparation. 1 three-hour lecture/problem-solving. Prerequisite: KIN 683/683L.

KIN 685/FN 685 Nutrition in Sports and Exercise (4)

Knowledge concerning the role of nutrients in optimizing human performance. Assessment of caloric and nutrient requirements associated with exercise. Special consideration is given to gender specific needs of athletes, nutritional ergogenic aids, and eating disorders. 4 seminars. Prerequisites: KIN 683/683L and FN 533.

KIN 696 Master's Degree Thesis (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/her mastery of the principles of the profession. May be repeated for a maximum of 9 units. Prerequisite: KIN 591, except Sport History. Advancement to Candidacy required.

FN 696 Master's Degree Thesis (3)

Compilation of data culminating in the summarizing and reporting, in thesis form, of independent supervised research. May be repeated for a maximum of 9 units. Advancement to Candidacy required.

KIN 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade RP until the completion of thesis and final oral examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required. This course is graded on a mandatory credit/no credit basis.

FN 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resisdent status in order to receive university services. Approval of graduate program coordinator is required to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.


CAL POLY POMONA
CAMPUS SHUTTLE
A

POLITICAL SCIENCE

MASTER OF PUBLIC ADMINISTRATION

In the Department of Political Science, College of Letters, Arts, and Social Sciences
www.csupomona.edu/~smemerson/

David Speak, Chair
Sandra M. Emerson, Graduate Coordinator

John L. Korey Renford R. Reese
Lisa S. Nelson

This program is designed to prepare individuals to be successful professionals and managers in the public sector at a time when government itself is being redefined. The program focuses on the relationships among public agencies, private sector as well as non-profit entities. It is designed to prepare those in allied professions, or in positions with responsibilities related to government, to work more effectively with government.

The goals of the program are to provide students with cutting-edge essential concepts, techniques and skills in understanding public administration, public policy, program evaluation, and information technology, and to make students aware of the ethical, practical and technical concerns of serving the public interest in a democratic society. The MPA program also aims at enhancing the student's understanding of the diverse perspectives that comprise the public interest.

The MPA program provides students with an opportunity to gain extended knowledge in the specific areas of public management, public finance and budgeting, human resources management, public policy theories and practices, and public management information technology.

ADMISSION REQUIREMENTS

An applicant for admission to the MPA program must have a bachelor's degree from an accredited college or university and satisfy university requirements for admission to graduate study. Although the bachelor's degree may be in any discipline, the applicant is advised to have taken the following courses or their equivalents:

PLS 314 Public Administration
STA 120 Statistics

In addition, the student should have a 3.3 GPA, or achieve a score of 2100 or above based on the following formula:

- Graduate Record Examination test score, plus 400 times the applicant's GPA.

Exceptions to this requirement may be made only after consideration by a three-member department admissions committee. Applicants must demonstrate a clear cause for an exception to the department's criteria.

Applicants must submit the following documents to the Department of Political Science:

a. a statement of the applicant's reasons for wanting to pursue the MPA degree,

b. a description of relevant professional work experience,

c. two letters of recommendation from prior academic instructors or from persons directly knowledgeable of the applicant's professional work experience, and

d. GRE scores (see exception above).

A TOEFL score of 580 or better is required for admission of international students to the program.

The MPA Graduate Coordinator will notify applicants of their admission or denial.

PROGRAM REQUIREMENTS

The MPA Graduate Coordinator will serve as advisor to all selected applicants.

Total program units required: 48 units for students with two full years of public sector related experience and 52 units for students without two full years of public sector related experience.

A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.

An official degree program of study (contract) will be finalized prior to the completion of the second quarter. It will be approved by the Graduate Coordinator and verified by the Graduate Studies Analyst.

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

In order to advance to candidacy for the MPA degree, a student must: (a) achieve unconditional standing; (b) complete at least 12 units of graduate coursework at Cal Poly Pomona with a GPA of 3.0 or better; (c) pass the Graduation Writing Test; (d) have an approved program of study (contract) on file, and (e) have a proposal for thesis or project.

Continuation in the Master in Public Administration program will occur as stipulated by the University for continuation in graduate studies.

The candidate must be enrolled in the university during the quarter of graduation.

CURRICULUM

CORE COURSES

Theories of Public Administration and Democratic Governance	MPA	500	(4)
Public Policy Formulation and Evaluation	MPA	501	(4)
Public Budgeting and Finance Administration	MPA	502	(4)
Public Human Resources: Issues and Management	MPA	503	(4)
Quantitative Methods for Public Sector Issues	MPA	504	(4)
Qualitative Analytic Methods in the Public Sector	MPA	505	(4)
Integration of Theories, Methods and Practices in Public Administration	MPA	600	(4)
Culminating Project	MPA	695	(4)
or Thesis	MPA	696	
Total core units			(32)

In addition to the required core courses, students without two full years of employment in a position with public administration-related responsibilities must complete an internship.

Field Work/Internship	MPA	698	(4)

All students must complete 16 additional units in consultation with the MPA advisor. Students are required to select either a course in administrative law or administrative ethics as one of the four electives.

ELECTIVES (16 Units)

Students must elect to take either

MPA 506 Administrative Ethics
or MPA 507 Administrative Law

The balance of their 16 units may be from among the following courses:

MPA 520 Intergovernmental Affairs
MPA 545 Public Organization Training and Development
MPA 550 Public Policy Program Evaluation
MPA 555 Contemporary Issues in Public Policy
MPA 599 Special Topics (ethics, crisis management, environmental policy, etc.)

Selected courses in the Graduate Business Administration program such as:

GBA 547 Management Information Systems
GBA 565/566 Professional Presentation

Other elective courses may be taken from graduate programs in related departments and colleges on campus. This allows students to draw on the expertise of faculty in education, business and planning, and related disciplines.

Electives are available in the areas of:

Community Development and Urban Planning
Education Administration
Environmental Issues and Administration
Finance and Accounting
Information Management and Technology

Other areas may be developed in consultation between the student and the graduate advisor. Please consult the Department of Political Science, MPA web page for specific information about recommended electives.

PUBLIC ADMINISTRATION COURSE DESCRIPTIONS

MPA 500 Theories of Public Administration and Democratic Governance (4)

Socio-economic, political contexts of public administration; role of public administration in the political process; social values, ethics and public interest; characteristics of public bureaucracy, theories and practices; role and responsibility in democratic accountability, governance. 4 hours seminar.

MPA 501 Public Policy Formulation and Implementation (4)

Public policymaking politics, process and execution in the public, public/private and public/not-for-profit context. Emphasis on policy development, planning, implementation strategies, organizational adaptation and assessing consequences for diverse community interests. 4 hours seminar.

MPA 502 Public Budgeting and Finance Administration (4)

Examines public agency discretionary decision making, administrative controls, agency coordination, rivalry; intergovernmental relations and budgetary process; emphasis on budgetary reform, planning, process, capital and operating budgets, fiscal management, public accounting procedures; integrated financial management systems. 4 hours seminar.

MPA 503 Public Human Resources Issues and Management (4)

Public service concepts, institutions; relationship to executive and legislative functions and issues; adult learning theories, group dynamics; human resource issues including workforce diversity, collaboration, conflict; use of volunteers; assessment methods and instruments. 4 hours seminar.

MPA 504 Quantitative Methods for Public Sector Issues (4)

Quantitative methodologies to define, execute, monitor, manage policy, program, projects. Emphasis on problem-solving, actual applications to organizational issues and ethical use of information and analysis in serving diverse community interests. 4 lectures/ problem-solving/ seminars.

MPA 505 Qualitative Analytic Methods in the Public Sector (4)

Qualitative methodologies to define, execute, monitor, evaluate public policies, programs. Use of theory to address public sector issues, need for collaboration; qualitative techniques; ethical randomization. Emphasis on problem-solving, actual applications; ethical use of information/analysis in serving diverse communities. 4 lectures/ problem-solving. Prerequisite: MPA 500.

MPA 506 Administrative Ethics (4)

An examination of administrative ethics as a subfield of the study of public administration in the United States, with special emphasis on practical considerations of individual choice, agency structure and public accountability. 4 hours lecture/discussion.

MPA 507 Administrative Law (4)

An examination of administrative law, a highly specialized subfield of public law in the United States, with special emphasis on the processes of agency action and decision making. 4 hours lecture/discussion. Prerequisite: graduate standing.

MPA 520 Intergovernmental Relations (4)

Issues explored: governance structures, federalism, intergovernmental grants, local and state relationships, legislative and administrative relationships, legislative intent, oversight and monitoring, intergovernmental decision making, administrative ethics. 4 hours seminar.

MPA 545 Leadership and Organizational Development (4)

Organizational development, change and innovation, models of organization, structure and design; social values. Context of public organization development; legal structure, political issues, public organization innovation; political and executive leadership characteristics. Faculty team, public administration and business administration will teach this course. 4 lectures/problem-solving.

MPA 550 Public Policy Program Evaluation (4)

Theoretical and practical issues of collaboration, management and support of policy changes; use of systematic design, development, analysis, execution, presentation to policy decision makers, managers and constituencies. Students will partner with public, non-profit or private sector agencies in policy assessments. 4 lectures/ problem-solving.

MPA 555 Contemporary Issues in Public Policy (4)

Public policy history, successes, failures; policy analyst's role, function; relationship to legislative, executive processes; policy alternatives and options, new models for program development, implementation. 4 hours seminar.

MPA 599/599A Special Topics for Graduate Students (1–4)

Study and exploration of topics of current interest related to public administration. Total credit limited to 12 units with a maximum of 4 units per quarter. May include lectures, seminars, service learning, activity, or

research or a combination as determined by the instructor.

MPA 600 Seminar on the Integration of Theories, Methods, and Practices (4)

Integration of major theoretical, methodological and practical subject matter; use of case studies, examination of reports, practitioner assessment; preparation and administration of field interviews; selection and presentation of project topic or master's thesis proposal. 4 hours seminar. Prerequisites: All core courses should be completed. Unconditional standing required.

MPA 692 Independent Study (1–4)

Independent study and research on a subject chosen by the student with the consultation, approval, and direction of an advisor. Course may be repeated. Maximum credit, 8 units. Unconditional standing required.

MPA 695 Project (4)

Graduate project integrating theories and methodologies; focus on practical concerns and issues of public and nonpublic agencies, diverse perspectives within a task-oriented framework. Contract with participating agency. Faculty and practitioner supervision. Specialized activity. Prerequisites: MPA 600.

MPA 696 Thesis (4)

Compilation, evaluation, interpretation, and presentation in thesis form of individual research supervised by faculty advisor. Prerequisites: Completion of all core courses. Specialized activity. Unconditional standing. Prerequite: MPA 600.

MPA 698 Field Work/Internship (1–4)

Internship in a public sector context. Work assignment developed in a Department of Political Science, MPA program-agency partnership. Assignment and number of units subject to advisor approval. May enroll for 1-4 units per quarter for a maximum of 4 units. Specialized activity. Prerequisites: MPA 500 and two other core courses.

MPA 699 Project or Thesis Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

COURSES IN RELATED DISCIPLINES

GBA 531 Production and Operations Management (4)

Introduction to fundamental concepts of production and operations management. Use of quantitative methods, forecasting, resource allocation, decision theory, capacity planning, project management, inventory and quality control. 4 lectures/problem-solving. Prerequisite: GBA 514.

GBA 547 Management Information Systems (4)

Management and development of information systems in modern businesses and the public sector from the customer and the MIS perspective. Information as strategic resource. Acquisition, analysis, integration, presentation of internal and external information. Information management in international and multinational enterprises. Ethical, social impacts. 4 lectures/problem-solving.

PSYCHOLOGY

MASTER OF SCIENCE IN PSYCHOLOGY

In the Department of Psychology and Sociology, College of Letters, Arts, and Social Sciences
www.class.csupomona.edu/bhs/

Laurie A. Roades, Chair
Jeffery S. Mio, Director, Graduate Program

The purpose of the Master of Science Program in Psychology is to provide students with coursework and the foundation in pre-degree supervised practice in marriage and family therapy (MFT). The program will prepare students for eventual MFT licensure. This, in turn, will prepare them for a variety of counseling jobs, from counselor positions in industrial programs to marriage and family therapy in clinic settings and private practice.

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 graduate study. A minimum requirement for admission is a baccalaureate degree in psychology with at least 24 semester or 36 quarter units in upper division psychology. Students with a baccalaureate degree in other fields, but who have strong psychology backgrounds, will also be considered. Applicants should have successfully completed upper division undergraduate psychology courses such as in statistics, experimental, history and systems, abnormal, personality, and psychological testing, and either an upper or lower division course in physiological psychology. Any deficiencies must be made up before the student receives unconditional graduate standing.

Applicants should have an undergraduate minimum grade point average of 3.0 (B) or better in both psychology courses and in their overall GPA. The minimum GPA cutoff may vary somewhat from year to year, depending on the applicant pool.

Applicants will also be required to submit three letters of recommendation, at least one being from a professor familiar with the applicant's ability to perform academically at the graduate level, a biographical sketch (2-4 pages), and a statement of purpose. Finalists will be expected to come to campus for an interview with members of the department's Graduate Admissions Committee. These sources of information will be used in evaluating each candidate with respect to character, emotional maturity, and general aptitude for the counseling profession.

REQUIREMENTS

A minimum of 74 quarter units (two years) is required for the Master of Science degree in Psychology. Coursework will satisfy course requirements for California MFT licensure. Full-time attendance with admission in a fall quarter will allow a student to complete the program in two years. Admission in the winter or spring quarters will necessarily result in part-time status and it will take the student longer to graduate. All courses designated as "First Year Courses" must be completed before practica can be started. Practica only begin in fall quarters and last the entire academic year.

A minimum GPA of 3.0 must be maintained in graduate studies. It is expected that courses will be passed with a minimum grade of 3.00 (B). Grades of less than B- will result in certain consequences: one grade of less than B- will result in automatic probationary status for the student; two grades of less than B- will result in students being subject to disqualification from the program.

Admission to the program does not admit a student to candidacy for the degree. Advancement to Candidacy is granted, upon the recommendation of the psychology faculty, when the student has completed all preparatory coursework prior to the comprehensive examination. In addition, the Graduation Writing Test (GWT) must be passed prior to Advancement to Candidacy. A total limit of 13 transfer and/or Extended University units petitioned for graduate credit may be included on a master's contract if they are within the 7-year time limit.

The candidate must be enrolled in the university during the quarter of graduation.

PROGRAM FOR THE MASTER OF SCIENCE IN PSYCHOLOGY

First Year Courses

Research Methods and Statistics	PSY	510	(4)
Advanced Topics - Human Development	PSY	515	(4)
Introduction to Family and Marital Therapy	PSY	545	(4)
Development-Family Life Cycle	PSY	550	(4)
Psychopathology I	PSY	555	(4)
Psychopathology II	PSY	560	(4)
Advanced Testing	PSY	565/565L	(4/1)
Ethical Issues in Counseling and Family Therapy	PSY	570	(4)
Cross-cultural and Gender Issues in Therapy	PSY	575	(4)
Total quarter units, first year			(37)

Second Year Courses

Psychobiology of Mental Disorders	PSY	530	(4)
Practicum I	PSY	580	(2)
Practicum II	PSY	585	(2)
Practicum III	PSY	590	(2)
Group Process and Group Therapy	PSY	595	(2)
Human Sexuality	PSY	598	(4)
Diagnosis and Treatment of the Family/Elder Abuse	PSY	605	(4)
Diagnosis and Treatment of Couples/Spousal Abuse	PSY	606	(4)
Diagnosis and Treatment of Children/Child Abuse	PSY	607	(4)
Special Problems in Treatment: Substance Abuse/Addiction	PSY	610	(2)
Supervised Practice	PSY	620	(2)
Advanced Supervised Practice I	PSY	621	(2)
Advanced Supervised Practice II	PSY	622	(2)
Comprehensive Exam	PSY	697	(1)
Total quarter units, second year			(37)

TOTAL QUARTER UNITS FOR PROGRAM ..... (74)

GRADUATE COURSE DESCRIPTIONS

PSY 510 Research Methods and Statistics (4)

Review of basic research methods. Systematic examination of advance research methods and statistical procedures. Extensive supervised experience in critiquing and redesigning research studies. 4 lectures/problem-solving. Prerequisite: Psychology program at Cal Poly and graduate standing.

PSY 515 Advanced Topics in Human Development (4)

This course focuses on developmental changes in, and interactions between, the physical, cognitive, social and emotional domains

throughout the life span. The influence of heredity and environment on development, including cross-cultural influences, will be considered. Psychopathology and its causes throughout the life span will also be highlighted. Prerequisite: Graduate Standing in Psychology program at Cal Poly.

PSY 530 Psychobiology of Mental Disorders

A neuropsychological overview of effects of brain trauma (stroke, closed head injury, etc.), and a psychobiological overview of the major mental disorders including schizophrenia, the affective disorders, Alzheimer's and developmental disorders such as autism. Introduction to neuropsychological assessment, and to pharmacological therapies. 4 seminars. Prerequisite: Graduate Standing in Psychology program at Cal Poly.

PSY 545 Introduction to Family and Marital Therapy (4)

History and development of family and marital therapy. Introduction to a variety of theoretical approaches with special emphasis on family systems. Exploration of the therapy process and the relationship of therapist's personality to that process. 4 lecture discussions. Prerequisite: Graduate Standing in Psychology program at Cal Poly.

PSY 550 Development—The Family Life Cycle (4)

Review of the literature on family life cycle stages and clinical outcomes. Major stages which nuclear, single parent and step families undergo during significant changes in life events and horizontal and transgenerational relationship changes. 4 lecture discussions. Prerequisites: PSY 545 and Graduate Standing in Psychology program at Cal Poly.

PSY 555 Psychopathology I (4)

Clinical features, diagnosis, prognosis, and suggested etiological explanations of non-psychotic, DSM categories from Axis 1, with special attention given to the familial and interpersonal relationship influences on pathological behavior. 4 lecture discussions. Prerequisite: Graduate Standing in Psychology program at Cal Poly.

PSY 560 Psychopathology II (4)

Clinical features, diagnosis, prognosis, and suggested etiological explanations of psychotic disorders, nonpsychotic disorders not covered in Psychopathology I, and Axis 2 categories, with special attention given to the familial and interpersonal relationship influences on pathological behavior. 4 lecture discussions. Prerequisites: PSY 555 and Graduate Standing in Psychology program at Cal Poly.

PSY 565/565L Advanced Testing (4/1)

Theory and practice in assessment techniques in clinical practice. Includes use of assessment procedures in diagnosis, outcome evaluation, as an intervention strategy, and in clinical research. 4 lectures/problem-solving, 1 three-hour laboratory. Prerequisites: PSY 510, PSY 570, and Graduate Standing in Psychology program at Cal Poly.

PSY 570 Ethical Issues in Counseling and Family Therapy (4)

Values, ethics, and legal issues in relational therapy. Emphasis on ethical thought and decision-making. Review of professional codes and family, marriage, and divorce laws as they relate to clinical practice. 4 lecture discussions. Prerequisites: Graduate Standing in Psychology program at Cal Poly.

PSY 575 Cross-cultural and Gender Issues in Therapy (4)

Exploration of gender and race/ethnic relations and their impact on family therapy interventions, on a micro as well as a macro level. Analysis of roles and tasks in families from a multi-cultural and gender perspective. 4 lecture discussions. Prerequisite: Graduate Standing in Psychology program at Cal Poly.

PSY 580 Practicum I (2)

Introduction to supervised experience in clinical skills required of marital and family therapists. Group supervision through video-taped sessions, and live supervision and case notes, will focus on difficult aspects of case management for the beginning therapist. Prerequisites: PSY 545, 515, 555, and 570. Corequisite: PSY 620. Graduate Standing in Psychology program at Cal Poly.

PSY 585 Practicum II (2)

Second in a series of group supervision courses. Students' work with marriage and family clients is supervised through faculty and peer discussion of video-taped and live cases. Help-seeking is encouraged for therapy/therapist difficulties. Prerequisite: PSY 580 with B or better. Corequisite: PSY 621. Graduate Standing in Psychology program at Cal Poly.

PSY 590 Practicum III (2)

Third in a series. Group supervision of students' therapy sessions with marriage and family clients. Supervision and peer discussion of video-taped and live sessions will be used. Students will present their difficult cases for supervision. Prerequisite: PSY 585 with B or better. Corequisite: PSY 622. Graduate Standing in Psychology program at Cal Poly.

PSY 595 Group Process and Group Therapy (2)

First in a sequence of two courses. Examines the techniques and processes of group therapy through readings, discussion and group exploration of various techniques. Experimental group therapy under professional clinical supervision. 2 lectures/problem-solving. Prerequisite: Graduate Standing in Psychology program at Cal Poly.

PSY 598 Human Sexuality (4)

Interdisciplinary considerations (biological, psychological, social) of research and theory related to human sexuality. Prevention and remediation of sexual problems. Clinical case material used to demonstrate dysfunctions and treatment. 4 lecture discussions. Prerequisite: Graduate Standing in Psychology program at Cal Poly.

PSY 605 Diagnosis and Treatment of the Family/Family Violence (4)

Part of a three-course sequence in Marriage and Family Therapy. Diagnostic assessment of family dysfunctions and therapeutic interventions, covering various approaches. Examination of family violence issues. Student begins to develop a personal orientation to family therapy using a systems approach. 4 lectures/problem-solving. Graduate Standing in Psychology program at Cal Poly.

PSY 606 Diagnosis and Treatment of Couples (4)

Part of a three-course sequence of didactic material in Marriage and Family Therapy. The focus is on the diagnostic assessment of couple dysfunctions and therapeutic interventions covering various approaches to working with couples. 4 lectures/problem-solving. Prerequisites: PSY 515 and graduate standing in Psychology program at Cal Poly.

PSY 607 Diagnosis and Treatment of Children/Child Abuse (4)

Part of a three-course sequence of didactic material in Marriage and Family Therapy. The focus in this course is on the diagnostic assessment of child behavior problems and child abuse and interventions with children and their families. 4 lectures/problem-solving. Prerequisite: PSY 515. Graduate Standing in Psychology program at Cal Poly.

PSY 610 Special Problems in Treatment: Substance Abuse/Addiction (2)

Exploration of the theory, research, and clinical treatment of substance abuse and addiction. The medical model of substance abuse treatment will be considered as well as the approach of systemic therapists. 2 lecture discussions. Graduate Standing in Psychology program at Cal Poly.

PSY 620 Supervised Practice (2)

Directed and supervised training in psychotherapy in a field placement or on-campus clinic setting. Weekly case presentations and discussions. Student functions with substantial responsibility at this level. Corequisite: PSY 580. Graduate Standing in Psychology program at Cal Poly.

PSY 621 Advanced Supervised Practice I (2)

Directed and supervised training in psychotherapy in a field placement or on-campus clinic setting. This continues the format of PSY 620 with steadily increasing student responsibility and autonomy. Weekly case presentations and discussions. Prerequisite: PSY 620 with B or better. Corequisite: PSY 585. Graduate Standing in Psychology program at Cal Poly.

PSY 622 Advanced Supervised Practice II (2)

Directed and supervised training in psychotherapy in a field placement or on-campus clinic setting. This continues the format of PSY 621 with steadily increasing student responsibility and autonomy. Weekly case presentations and discussions. Prerequisites: PSY 620 and PSY 621 with B or better. Corequisite: PSY 590. Graduate Standing in Psychology program at Cal Poly.

PSY 697 Comprehensive Exam (1)

Students will take an essay examination based on all required coursework. The examination may be taken no more than two times. Failure to complete it satisfactorily the second time results in termination from the program. Advancement to Candidacy required. Graduate Standing in Psychology program at Cal Poly.

PSY 699 Master's Degree Continuation

Enrollment in this course allows candidates that have enrolled in all required coursework to maintain resident status in order to receive university services. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis. Graduate Standing in Psychology program at Cal Poly.

COLLEGE OF SCIENCE

http:www.csupomona.edu/~sci

Mandayam A. Srinivas, Interim Dean
Barbara A. Hacker, Associate Dean

The curricula offered in the College of Science combine fundamental education in science or mathematics with a broad human outlook, aimed at developing the students' mental horizons beyond the limits of their immediate vocational objectives.

Each curriculum is designed to prepare graduates for specific professional positions in industry, government, and teaching or for graduate and professional work in their disciplines. The standard teaching credential program is offered for both the elementary specialization and the secondary specialization in a number of majors and minors. A pre-professional program is offered for students preparing for medical, dental, or veterinary or other health career schools.

The College of Science actively fosters dialogue and joint research among campus scientists through special institutes and symposia. The Institute for Cellular and Molecular Biology (see catalog section on "Special University Centers") and the Institute for Advanced Systems Studies are particularly active in these areas.

An active co-curricular program includes the Science Council; Beta Beta Beta Biological honor society; Biological Sciences Club; Microbiology Club; a chapter of Kappa Mu Epsilon (mathematics); a chapter of student affiliates of the American Chemical Society; Society of Physics Students; Sigma Pi Sigma, national honor society in physics; Upsilon Pi Epsilon, national honor society in Computer Science; the Geology Club and other organizations.

The College of Science supports the concept of international education and encourages students to investigate opportunities for overseas study. Certain courses taken at CSU International Program study centers in foreign countries are equivalent to courses in the College of Science and may be used to fulfill some of the degree requirements offered by the College and/or certain general education requirements. Students should consult the International Programs Bulletin (which is available at the International Center), a department advisor, or the campus International Programs Coordinator for more information.

GRADUATE DEGREE PROGRAMS

BIOLOGICAL SCIENCES

Frank Ewers, Chair
Master of Science in Biological Sciences.

CHEMISTRY

Franics Flores, Chair
Master of Science in Chemistry

COMPUTER SCIENCE

Craig A. Rich, Chair
Master of Science in Computer Science

MATHEMATICS AND STATISTICS

Michael L. Green, Chair
Master of Science in Mathematics

Teacher Education and Professional Development

The College of Science offers numerous programs for preparing teachers of mathematics and science. The details of the science preparation programs can be found under the listings of the individual science departments. The mathematics subject matter preparation program is described in that department's' section. In addition, the College sponsors numerous professional development programs for pre-K through grade 12 teachers.

Center for Education and Equity in Mathematics, Science, and Technology (CEEMaST)

Nicole Wickler, Director Science Teacher Education
Jodye I. Selco, Science Educator

CEEMaST coordinates the College of Science's responses to issues in K-12 science and mathematics education. Its purpose is to contribute to the improvement of science and mathematics education in preschool, elementary and secondary schools. To this end it conducts workshops and courses for teachers, consults with local schools and districts, and maintains an instructional materials library for K-12 teachers' use. In addition, CEEMaST coordinates the subject matter preparation programs in science and advises students who are interested in preparing to be science and mathematics teachers.. For Information contact the CEEMaST office at (909) 869-4063 or visit www.ceemast.csupomona.edu/

BIOLOGICAL SCIENCES

MASTER OF SCIENCE IN BIOLOGICAL SCIENCES

In the Department of Biological Sciences, College of Science
www.csupomona.edu/~biology/gradprog

Frank W. Ewers, Chair, Biological Sciences Department
David J. Moriarty, Graduate Coordinator

The Master of Science degree program in the Biological Sciences enhances the knowledge and competence of the student in the chosen field of specialization and develops potential for continuing self-directed study and research. The curriculum is designed to increase the student's knowledge of the discipline by providing theoretical, technical and practical studies. It also provides students with training in the use of research techniques, as well as familiarity with the critical evaluation of, and the use of scientific literature. Graduate study specializations may be elected in the disciplines of the biological sciences: biology, biotechnology, botany, microbiology and zoology.

ADMISSION TO THE PROGRAM

An applicant 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 related field. The minimum requirements for admission are: 24 quarter units in upper division biological sciences, 15 quarter units in chemistry and 12 quarter units in physics and/or mathematics. These courses must be comparable to those required for a baccalaureate major at this university.

A statement of intent indicating the professional goals and research interests should be submitted. Three letters of recommendation should be submitted from individuals qualified to judge the applicant's potential for success in a graduate program. Applicants are encouraged to submit scores on the General Test and/or Subject Test (Biology Subject Test or Biochemistry, Cell/Molecular Biology Subject Test) of the Graduate Record Examination (GRE). These scores are not required, but may assist the faculty in assessing an applicant's preparation for graduate work. Admission is determined by the members of the Graduate Faculty, based on the total academic record of the applicant. Potential applicants are encouraged to contact members of the Graduate Faculty to discuss research interests, available space, and qualifications. The sponsoring Graduate Faculty member will provide initial advising, but it will be the responsibility of the student to secure a thesis advisor. Admission to the program is competitive, and applicants must have a sponsor to be admitted. Therefore, it is important that all applicants develop contacts with the Graduate Faculty.

The unconditional graduate student with an advisory committee will develop a program in a selected discipline of biology based upon 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.

REQUIREMENTS

1. The degree program must include a minimum of 45 quarter units; at least 24 units must be in 500-600 level courses.
2. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.

   A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.
3. The student must complete the program based upon the curriculum outlined below.
4. A grade point average of 3.0 (B) or better must be maintained in all upper division undergraduate and all graduate classes.
5. The Graduation Writing Test (GWT) must be passed prior to Advancement to Candidacy.
6. Advancement to Candidacy is required.
7. An acceptable thesis must be completed and submitted for binding in accordance with university regulations.
8. A final oral examination must be successfully completed.
9. The candidate must be enrolled in the university during the quarter of graduation.

CURRICULUM

Required Courses

Seminar in Biology	BIO	680	(3)
Presentation of Research Proposal	BIO	693	(1)
Thesis Research in Biological Sciences	BIO	694	(6)
Master's Degree Thesis	BIO	696	(3)

COURSE IN SPECIALIZATION

To be selected with consent of the student's thesis committee from 400, 500 and 600-level courses, 32-37 units including at least 11 units of approved 500- and 600-level courses.

Total . . . . . (45-50)

GRADUATE COURSE DESCRIPTIONS

NOTE: For all courses which have both a lecture component and a laboratory component (e.g., BIO 510/510L), both components are co-requisites, and must be taken concurrently.

BIO 500 Training in Graduate Research (1–3)

Advanced training in laboratory, field, or computational techniques under the supervision of a faculty member. Enrollment requires: (1) Prior arrangement with a faculty member. (2) Completion of a supervisory form available in the Biological Sciences Department office. Open to postbaccalaureate students. Graduate faculty.

BIO 520/520L Endocrinology (3/1)

Study of the endocrine glands and their role in growth development, metabolic regulation and reproduction in animals. 3 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required. Prerequisites: CHM 327/327L and ZOO 428/428L. Eskandari

BIO 525/525L Ecology of Fungi (2/2)

Autecology and synecology of fungi in soil, water, atmosphere, living and dead tissues, buildings and other environments; saprophytism; commensalism, mutualism and parasitism; methods of collection, isolation and ecological study; forensics; some independent study required. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Prerequisite: BOT 425/L or BOT 426/L. Stoner.

BIO 527/527L Community Analysis (3/1)

Statistical analysis of univariate and multivariate data from biotic communities. Spatial pattern analysis, species abundance and distribution models, diversity indices, niche breadth and overlap, species association and covariation, and classification and ordination methods. 3 lecture discussions, 1 three-hour computer and problem-solving laboratory. Prerequisites: BIO 325/325L. Carlton.

BIO 528 Community Ecology (3)

Patterns in the diversity, relative abundance and manner in which communities of plant and animal species are assembled. Competition, co-existence strategies and their effect on community structure within the framework of natural selection. 3 lecture discussions. Prerequisite: BIO 325/325L. Moriarty.

BIO 530 Mechanisms of Speciation (3)

Principles and concepts of evolutionary mechanisms in plants and animals. 3 lecture discussions. Prerequisites: BIO 303, BIO 325/325L, and BIO 413. Staff.

BIO 532L Tropical Field Biology (2–6)

A 2-3 week field trip in the neotropics of Central or South America covering the ecology and natural history of tropical ecosystems. Field research projects; lectures by Cal Poly Pomona faculty and local experts. Consent of instructors required. Students will be responsible for field-trip expenses. Lectures/problem-solving, laboratory. Prerequisite: BIO 485. George.

BIO 534/534L Water Pollution Biology (3/2)

Effects of pollution on aquatic organisms. Emphasis on experimental investigation in laboratory and field. 3 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Arnold.

BIO 535 Advanced Cell Biology (4)

Molecular, ultrastructural and functional approach to cell biology. 4 lecture discussions. Prerequisites: BIO 428/428L and CHM 327/327L. Alas, Liu.

BIO 536 Conservation Biology (4)

Application of principles of ecology, biogeography,population genetics, and human activities to maintenance of biological diversity throughout the world. Trends in global biodiversity, demograhic processes, invasive species, habitat fragmentation and restoration, laws, management principles and applications, ethics, and endangered species. Prerequisite: BIO 325/325L. Staff.

BIO 540 Biogeography (3)

Principles and concepts of the distribution of plants and animals throughout the world. Origins and dispersal of modern flora and fauna as related to environmental and historical factors. 3 lecture discussions. Prerequisites: BIO 325/325L and BIO 413. Staff.

BIO 542L Graduate Laboratory (1–3)

Advanced laboratory experience, individually arranged or concurrent with another graduate course, particularly BIO 575. Corequisite BIO 542L and BIO 575 sections have the same course title. May be repeated for a maximum of 10 units. Staff.

BIO 545/545L Physiology of Plant Disease (3/1)

Physiology and biochemistry of host-parasite relations, mechanisms of pathogenesis and the bases for resistance and specificity in plant diseases, with special emphasis on diseases caused by fungi and bacteria. 3 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required. Prerequisite: BOT 323/323L. Staff.

BIO 548/548L Advanced Plant Physiology (2/2)

Selected major aspects of plant water relations, metabolism and growth. Emphasis on experimental investigations. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Prerequisite: BOT 428/428L. Staff.

BIO 550/550L Plant Growth and Development (2/2)

Hormonal and environmental control of plant morphogenesis. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Prerequisite: BOT 428/428L. Staff.

BIO 555 Molecular Biology of Development (4)

Consideration of molecular mechanisms involved in differentiation as they relate to such phenomena as tissue specificity, gene control, morphogenesis, cell specialization. 4 lecture discussions. LaMunyon, Sperry.

BIO 560 Advanced Bacterial Physiology and Genetics (4) Every other year

Discussion of advanced topics in bacterial physiology and genetics with emphasis on gene regulation and molecular control of cell division, sporulation, biosynthesis, cellular functions and pathogenesis. 4 lecture discussions. Lin

BIO 565/565L Animal Tissue Culture (2/2)

Principles, basic methodology and special applications of animal cell culture. 2 lecture discussions, 2 three-hour laboratories. Concurrent enrollment required. Prerequisite: MIC 201/201L. Buckley, Pal.

BIO 570/570L Cellular Immunity and Disease (3/1)

T-cell mediated immunity; its protective and pathogenic roles; mechanisms of cellular immunity, its importance in infectious disease, transplant rejection, tumor surveillance and autoimmune phenomena. Laboratory provides experience with lymphocyte tissue cultures, lymphocyte immune response in vitro, skin grafting and passive cellular immunity. 3 lecture discussions, 1 three-hour laboratory. Concurrent enrollment required. Prerequisite: MIC 415/415L. Adler.

BIO 575 Advanced Topics in Biology (1–4)

Group study of advanced topics selected to correspond with changes in the field or needs of advanced students. Instruction by lecture and discussion. Course title and number of units are specified in advance. Some courses have a corequisite BIO 542L laboratory with the same title. Students receive credit for multiple courses with the BIO 575 designation if course titles are different. Staff.

BIO 576 Regulatory Affairs for the Biotechnology Industry (3)

This course will introduce and familiarize students with the terminology, timelines, and actual steps followed by Regulatory Affairs professionals employed in the biotechnology industry. Case studies from industry will be examined to supplement certain topics and to illustrate interpretation of regulations. 3 lecture discussion. Prerequisites: One year of basic biology and one year of general chemistry. Adler, Lin.

BIO 577/577L Transmission Electron Microscope Techniques (2/3)

Skills and techniques in transmission electron microscopy, including

specimen preparation, operation of the TEM and ancillary equipment and darkroom techniques. Material of interest to individual students may be studied. Students are responsible for supplying their own photographic materials (film and photographic paper). 2 lecture discussions, laboratory, 9 hours by arrangement. Concurrent enrollment in lecture and lab is required. Prerequisites: BIO 423/423L. Eskandari, Kageyama.

BIO 578/578L Scanning Electron Microscope Techniques (2/3)

Skills and techniques in scanning electron miscroscopy, including specimen preparation, operation of the SEM and ancillary equipment and darkroom techniques. Material of interest to the student may be studied. Students are responsible for supplying their own photographic materials (film and photographic paper). 2 lecture discussions, laboratory, 9 hours by arrangement. Concurrent enrollment in lecture and lab is required. Prerequisites: BIO 423/423L. Staff.

BIO 579 Recent Advances in Ultrastructure Research (3)

Current developments in major fields of ultrastructure research. 3 lecture discussions. Staff.

BIO 580 Introduction to Instructional Methods in Biology (1) Once a year

Introduces beginning graduate teaching assistants to instructional methods necessary for effective teaching in a laboratory setting. Strategies of laboratory instruction and the development of effective presentation skills are emphasized. May not be used for degree credit. 2-day workshop. Open only to graduate students in good standing with the University. Staff.

BIO 581/581L Transport Across Cell Membranes (3/2)

Practical and theoretical considerations of water and solute transport across cell membranes. Thorough discussion of the structure and function of major transport proteins including pumps, ion-coupled co-transporters and exchangers, voltage- and ligand-gated ion channels, water channels, and facilitative transporters. Examination of the role of transport proteins as they relate to physiological phenomena such as membrane excitability, vesicle fusion, nutrient absorption, and water homeostasis. Laboratory reinforces the principles and provides exposure to microinjection, ion-selective electrodes, electrophysiological methods (patch clamp and two-electrode voltage clamp), data acquisition, and data analysis. 3 lecture discussions, 2 three-hour laboratories. Prerequisites: BIO 428/428L or ZOO 428/428L, CHM 329/329L, PHY 123/123L or 133/133L. Eskandari.

BIO 590 Experimental Biology (3)

Lecture series concerning recent research in selected fields of biology; each series to have a subtitle identifying the field. Total credit limited to 9 units. 3 lecture discussions. Staff.

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 per quarter, maximum of 9 units. Unconditional standing required. Staff.

BIO 691 Directed Study (1–3)

Individual research in a specialized area on an advanced topic under the direction of a graduate faculty member. Mayor may not lead to a thesis. Enrollment requires: (1) Prior arrangement with a faculty member. (2) Completion of a supervisory form available in the Biological Sciences Department office. Unconditional standing required. May be repeated for a maximum of 6 units. Graduate faculty.

BIO 692 Independent Study (1–3)

Study, research, or readings proposed by the student with the consultation and approval and under the supervision of a faculty member, but not leading to a thesis/project. Enrollment requires: (1) Prior arrangement with a faculty member. (2) Completion of a supervisory form available in the Biological Sciences Department office. Unconditional standing required. May be repeated for a maximum of 6 units. Graduate faculty.

BIO 693 Presentation of Research Proposal (1)

A public oral presentation and discussion of a proposed research plan for the master's thesis. Required for Advancement to Candidacy. Unconditional standing required. Graduate Faculty. This course may be taken on a credit/no credit basis.

BIO 694 Thesis Research in the Biological Sciences (1–3)

Selection and completion of laboratory, field, or computational research project under the supervision of a graduate faculty member, leading to new knowledge as part of the preparation for writing a thesis. Total credit limited to 6 units, but may be taken for more. Unconditional standing required. Graduate faculty.

BIO 696 Master's Degree Thesis (1–3)

Compilation, evaluation, interpretation, and report of research for thesis directed by a committee of graduate faculty members. Completion of approved, bound thesis, and public oral presentation of research. Total credit limited to 3 units, but may be taken for more. Advancement to Candidacy required. Prerequisite: BIO 694. Graduate faculty.

BIO 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Approval of faculty advisor is required to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

CHEMISTRY

Master of Science in Chemistry

In the Department of Chemistry, College of Science
www.csupomona.edu/~chemistry

Katherine Kantardjieff, Chair
Sean X. Liu, Graduate Coordinator

The Master of Science degree in Chemistry provides a comprehensive understanding of the principles of chemistry and application in detail to advanced problems. This understanding will be gained through course work, seminar, independent study and research. The program is designed to provide the student with the necessary skills and techniques to reach the applicant's 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, 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 the student's 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 on a conditional basis 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.

The Master's in Chemistry requires a minimum score of 6.5 on International English Language Testing System.

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

REQUIREMENTS

1. The degree program must include a minimum of 45 quarter units. At least 24 units must be taken in 500-600 level courses.
2. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.
3. The student must complete his program based upon the curriculum outlined below.
4. The student must demonstrate a reading knowledge of a modern foreign language or proficiency in a computer programming language acceptable to the chemistry department.
5. A grade point average of 3.0 (B) or better must be maintained in all upper division undergraduate and all graduate courses.
6. Advancement to Candidacy must be achieved. Satisfaction of the Graduation Writing Test (GWT) requirement is necessary before advancement.
7. An acceptable thesis must be completed and the necessary copies submitted in accordance with university regulations.
8. An examination in defense of the thesis must be successfully completed.
9. The candidate must be enrolled in the university during the quarter of graduation.

CURRICULUM

Required Courses

Seminar in Chemistry	CHM	550	3

(Student must enroll for 1 unit of seminar during 3 separate quarters)

Thesis Research in Chemistry	CHM	694	0-6
Master's Degree Thesis	CHM	696	3-9

(Total of 9 units with 3 or more from CHM 696 required.)
Courses in an area of Specialization 8

Select 6 units in an area of specialization, to be selected from CHM 522, 523 (theoretical); CHM 541, 542, 543 (organic); CHM 553, 554 (physical); CHM 561, 562 (biochemistry); CHM 571, 572 (inorganic) or CHM 581, 582, 583 (analytical). Each of these courses requires a concurrent enrollment in 1 unit of CHM 513, Independent Study.

Approved electives 25
Total minimum 45

GRADUATE COURSE DESCRIPTIONS

The notations F, W, Sp, Su and even or odd indicate which quarter(s) of even or odd numbered calendar years the course is normally offered. Courses not designated "even" or "odd" are offered each year.

CHM 513 Independent Study in Advanced Chemistry (1) F, W, Sp

Reading and reports on papers in the literature, solving of assigned problems. Minimum of 60 hours total time. Concurrent: any of CHM 522, 523, 541, 542, 543, 544, 553, 554, 561, 562, 571, 572, 581, 582, 583. May be repeated for a maximum of 7 units.

CHM 522, 523 Advances in Chemical Physics (3)(3) W, Sp, odd years, respectively

Application of quantum chemistry to problems of atomic and molecular structure; molecular orbital and valence bond theories. Theory of transition moments and application to IR, UV, RAMAN and spin resonance spectroscopy. Applications of reaction dynamics. 3 lecture discussions. Concurrent: CHM 513. Prerequisite: CHM 419 or consent of instructor.

CHM 531 Solution and Relaxation Kinetics (3) Sp, even years

The main focus will be on the application of relaxation kinetics to the study and analysis of relatively complex multi-step reactions in solution. Treatment will unify practical and theoretical considerations with respect to experimental design, instrumentation, limitations and relationship to conventional kinetic methods. Specific topics will include: spectrophotometric detection of intermediate, reversible and non-

reversible systems, introduction to normal mode analysis, amplitude effects and detailed analysis of representative examples from the recent literature and research in progress. 3 lectures/problem-solving. Prerequisite: CHM 305 or 313 or consent of instructor.

CHM 541, 542, 543 Selected Topics in Organic Chemistry (3) (3) (3) F, W, Sp, respectively

Recent advances in topics of interest in the area of organic chemistry, for example, reaction mechanism, synthesis, spectroscopy, polymers, heterocycles, natural products as well as physical organic, organometallic, bio-organic, industrial and photochemistries. Each course may be repeated once for credit. 3 lecture discussions. Concurrent: CHM 513.

CHM 544 Special Topics in Organic Chemistry (3) Sp, even years

Selected topics in organic chemistry. Course may be repeated once for credit. 3 lecture discussions. Concurrent: CHM 513.

CHM 550 Seminar in Chemistry (1) F, W, Sp

Special study in selected areas of chemistry. May be repeated for a maximum of 3 units. 1 seminar.

CHM 553, 554 Advances in Physical Chemistry (3)(3) F, odd years; W, even years, respectively

Selected topics from advanced physical chemistry such as statistical mechanics, electrochemistry kinetics and solution chemistry. 3 lecture discussions. Concurrent: CHM 513.

CHM 561, 562 Selected Topics in Biochemistry (3)(3) W, Sp respectively

Basic principles as applied to topics of biochemical interest, such as: cellular energetics and kinetics, analysis of the structure and function of proteins and other macromolecules, feedback control metabolism, trace nutrients, biochemistry of membranes, marine biochemistry, biochemical genetics and biochemical evolution. Each course may be repeated once for credit. 3 lecture discussions. Concurrent: CHM 513.

CHM 565 Biochemical Mechanisms (3) F, odd years

General mechanistic principles of organic and inorganic chemistry as they relate to biochemistry. 3 lecture discussions.

CHM 567 Advanced Clinical Chemistry (3) Sp, odd years

Chemical basis of recent advances in analytical methods and techniques, basis of new instrumentation, treatment of data and interpretations of clinical analyses. 3 lecture discussions.

CHM 571, 572 Advances in Inorganic Chemistry (3)(3) W, Sp, even years, respectively

Selected topics in advanced inorganic chemistry such as physical methods of inorganic chemistry, reaction mechanisms, organometallic chemistry and applications of group theory. 3 lecture discussions. Concurrent: CHM 513.

CHM 581, 582, 583 Advances in Analytical Chemistry (3)(3)(3) F, W, Sp, respectively

Selected topics in modern analytical chemistry. Each course may be repeated once for credit. 3 lecture discussions. Concurrent: CHM 513.

CHM 691 Directed Study (1–3) F, W, Sp, Su

Independent study in an area chosen by the student under the supervision and direction of a graduate faculty member. Total credit limited to 3 units. Unconditional standing required.

CHM 694 Thesis Research in Chemistry (1–3) F, W, Sp, Su

Research in area of specialization conducted as part of the preparation for writing a thesis under the direction of a graduate faculty member. Total credit limited to 6 units. Unconditional standing required.

CHM 696 Master's Degree Thesis (1–3) F, W, Sp, Su

Compilation, evaluation, interpretation and report of research for thesis. (3 units minimum.) Total credit limited to 9 units. Advancement to Candidacy required.

CHM 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Approval of faculty advisor is required to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

COMPUTER SCIENCE

MASTER OF SCIENCE IN COMPUTER SCIENCE

In the Department of Computer Science, College of Science
www.csupomona.edu/~cs/ms

Craig A. Rich, Chair
Salam Salloum, Graduate Coordinator

The Master of Science program in Computer Science provides an opportunity for students to enhance their understanding of hardware and software themes. Students will also learn how to analyze and formulate solutions for many advanced problems which occur in computer systems. The program stresses technical competence and encourages the student in independent work and judgment.

ADMISSION TO THE PROGRAM

1. Applicants seeking unconditional admission must have a bachelor's degree in Computer Science or closely related field with a GPA of 3.0 or better in all courses or the most recent 90 quarter units (60 semester units) attempted, and have successfully completed courses covering the following topics with a GPA of 3.0 or better:

   18 quarter units (12 semester units) including Calculus, Linear Algebra, and Probability and Statistics

   18 quarter units (12 semester units) including Object-Oriented Programming, Discrete Structures and Logic, Data Structures, and Computer Organization and Digital Design

   18 upper division quarter units (12 upper division semester units) including Language Translation and Automata, Design and Analysis of Algorithms, Computer Architecture, Operating Systems, and Software Engineering.

2. Applicants who do not meet unconditional admission but have a bachelor's degree with a GPA above 2.8 may seek conditional admission. Conditional admission requires successful completion of courses covering the following topics with a GPA of 3.0 or better:

   18 quarter units (12 semester units) including Calculus, Linear Algebra, and Probability and Statistics

   18 quarter units (12 semester units) including Object-Oriented Programming, Discrete Structures and Logic, Data Structures, and Computer Organization and Digital Design

   Students in conditional standing must satisfactorily complete a prescribed list of upper division courses before becoming eligible for unconditional graduate standing.

Applicants whose native language is not English and who hold a bachelor's degree from a college or university where the principal language of instruction was not English must have passed the International English Language Testing System (IELTS) exam with a minimum score of 6.5 or the Test of English as a Foreign Language (TOEFL) exam with a minimum score of 213 on the computer-based, or 550 on the paper-based, or 80 on the Internet-based TOEFL.

REQUIREMENTS

Students are urged to know the general scholastic requirements described in the "Graduate Studies" section of the catalog.

All graduate students must meet with the program coordinator and prepare a study list that will define all courses and other requirements to be completed for the degree.

No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.

A total limit of 13 transfer, Extended University, and/or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above. A grade point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and all graduate courses.

Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is granted to an unconditional student, having passed the Graduation Writing Test (GWT) and upon the recommendation of his/her faculty advisor, and implies a readiness to attempt thesis. The candidate must be enrolled during the quarter of graduation.

CURRICULUM

Required Courses (14 units)

Advanced Computer Architecture	CS	525	(4)
Advanced Algorithm Design and Analysis	CS	530	(4)
Advanced Software Engineering	CS	580	(4)
Graduate Seminar	CS	664	(2)

Required Project or Thesis (3 or 7 units)

Directed Study	CS	691	(1)
and Master's Degree Project	CS	695	(2)
OR			
Directed Study	CS	691	(3)
and Master's Degree Thesis	CS	696	(4)

Elective Courses (28 or 24 units)

Select 28 units (with Master's Degree Project) or 24 units (with Master's Degree Thesis) from the following list of courses or other courses approved by the Computer Science Graduate Committee:

Computer-Assisted Instruction	CS	510	(4)
Automated Reasoning	CS	515	(4)
Natural Language Processing	CS	517	(4)
Computer Vision	CS	519	(4)
Robotics	CS	521	(4)
Expert Systems	CS	523	(4)
Computability and Complexity Theory	CS	531	(4)
Parallel and Distributed Algorithms	CS	535	(4)
Topics in Compiler Design	CS	540	(4)
Programming Languages Semantics	CS	541	(4)
Computer Image Processing	CS	555	(4)
Bioinformatics for Computer Scientists	CS	560	(4)
Advanced Computer Networks	CS	565	(4)
Distributed Computing Systems	CS	566	(4)
Human Computer Interaction	CS	570	(4)
Topics in Database Systems	CS	575	(4)
Software Verification and Validation	CS	585	(4)
Special Topics for Graduate Studies	CS	599	(4)

Total Units 45

GRADUATE COURSE DESCRIPTIONS

Graduate courses presume that students have been admitted unconditionally to the program and have strong competence in programming and data structures.

CS 510 Computer–Assisted Instruction (4)

General techniques for designing computer systems to provide individualized instruction. Program structure, instruction layout, scoring systems and data organization methods. Existing CAI packages and development of new packages. Hardware requirements for audio-visual effects. 4 lectures/problem-solving. Prerequisite: CS 420 or consent of instructor.

CS 515 Automated Reasoning (4)

Logical foundations, logical representation of knowledge, unification, theorem proving, deductive databases, logic programming, program verification and synthesis, nonstandard logics, epistemic logic, temporal logic. 4 lectures/problem-solving. Prerequisite: CS 420 or consent of instructor.

CS 517 Natural Language Processing (4)

Grammatical structure and parsing of natural language, representations of meanings (semantics), story understanding and generation, applications. 4 lectures/problem-solving. Prerequisites: CS 420 and PHL 202, or consent of instructor.

CS 519 Computer Vision (4)

Representation of images, image data acquisition, methods of object recognition, representation of visual knowledge, boundary detection, texture, motion, the problem of occlusion, applications. 4 lectures/problem-solving. Prerequisite: CS 420 or consent of instructor.

CS 521 Robotics (4)

Robot programming, languages and simulation. Origins and taxonomy of robots. Case study in robot architecture, hardware and software. Homogeneous transformations. Kinematic equations and their solution. Elementary digital control. 4 lectures/problem-solving. Prerequisite: CS 420 or consent of instructor.

CS 523 Expert Systems (4)

Expert systems construction. Knowledge representation, utilization and acquisition. Rule-based systems, fuzzy logic, knowledge engineering. 4 lectures/problem-solving. Prerequisite: CS 420 or consent of instructor.

CS 525 Advanced Computer Architecture (4)

Architecture and organization of high performance computers. Principles of instruction sets. Pipelining, instruction level parallelism and multi-processor. Memory, storage, and interconnection. Quantitative analysis and evaluation of design alternatives. Historical developments. Architectural tradeoffs and innovations. 4 lectures/problem-solving. Prerequisite: CS 365 or consent of instructor.

CS 530 Advanced Algorithm Design and Analysis (4)

Advanced problem domains, including graph problems, pattern matching, compression, network flow and transforms. Amortized and average case analysis. Lower bounds. Approximation techniques. Probabilistic algorithms. 4 lectures/problem-solving. Prerequisite: CS 331 or consent of instructor.

CS 531 Computability and Complexity Theory (4)

Formalizing problems and algorithms. Characterizations and properties of computability classes, undecidability. Complexity classes. NP-complete problems, proof of NP-completeness. 4 lectures/problem-solving. Prerequisites: CS 311 and CS 331, or consent of instructor.

CS 535 Parallel and Distributed Algorithms (4)

Models of parallel and distributed computation. Design and analysis of algorithms for parallel and distributed systems. Basic techniques, classic problems. Parallel and distributed complexity classes. Hardware and software issues involved in parallel and distributed problem solving. 4 lectures/problem-solving. Prerequisite: CS 331 or consent of instructor.

CS 540 Topics in Compiler Design (4)

Code and loop optimization. Data flow analysis. Syntax-directed translation. 4 lectures/problem-solving. Prerequisite: CS 411 or consent of instructor.

CS 541 Programming Language Semantics (4)

Operational, denotational and axiomatic semantics of programming languages. Vienna definition language, w-grammars, LISP definition. 4 lectures/problem-solving. Prerequisite: CS 408 or consent of instructor.

CS 555 Computer Image Processing (4)

Digital picture processing. Mathematical preliminaries for image processing. Visual perception. Digitization and compression. Image enhancement, restoration and reconstruction. 4 lectures/problem-solving. Prerequisites: MAT 214 and CS 331, or consent of instructor.

CS 560 Bioinformatics for Computer Scientists (4)

Overview of molecular biology including genomics and proteomics. Alignment, phylogenic tree and search algorithms. Survey of existing bioinformatics tools. Coverage of sequence search and alignment algorithms. Application of AI techniques including neural network, heuristics and genetic algorithms for problem solving. Usage of script languages for solving problems in bioinformatics. Visualization of biological and chemical data. Hardware and software aspects of microarray. 4 lectures/problem-solving. Prerequisite: CS 420 or consent of instructor.

CS 565 Advanced Computer Networks (4)

Issues in network architectures and standards. Network design. Performance evaluation and monitoring. Network management and security. High-speed networking technologies. Wireless networks and mobile computing. System architecture and network programming. 4 lectures/problem-solving. Prerequisite: CS 380 or consent of instructor.

CS 566 Distributed Computing Systems (4)

Processors and processes in distributed systems. Distributed operating systems. Transactions and distributed file servers. Fault tolerance. Performance analysis. Cluster computing. Prototypes and commercial distributed systems. 4 lectures/problem-solving. Prerequisites: CS 380 and CS 431, or consent of instructor.

CS 570 Human Computer Interaction (4)

Principles of human factors, computer technology, and their interactions. Theory and practice of user interface design and evaluation. Special topics such as graphical user interfaces, graphics programming, multi-sensory systems, and computer-supported cooperative work.

CS 575 Topics in Database Systems (4)

Advanced SQL programming. Trigger and stored procedure. Relational, object-oriented, object-relational, and semi-structured modeling and databases. Techniques and algorithms of database design. Query languages for different database models. XML and Web data. Distributed database. Information integration. Data warehouses. Data mining. 4 lectures/problem-solving. Prerequisites: CS 435 or consent of instructor.

CS 580 Advanced Software Engineering (4)

Software metrics and models. Software development methodologies. Advanced topics in object-oriented software engineering. Formal methods for modeling and specification. Software architecture. Software testing. Real-time software development. Recent developments in software engineering. 4 lectures/problem-solving. Prerequisite: CS 480 or consent of instructor.

CS 585 Software Verification and Validation (4)

Techniques for evaluating software quality and integrity. Quality assessment, proof of correctness, testing methods. 4 lectures/problem-solving. Prerequisite: CS 480 or consent of instructor.

CS 599/599A/599L Special Topics for Graduate Students (1–4)

Group study of a selected topic, the title to be specified in advance. Instruction by lecture, activity, laboratory or combination. Prerequisite: consent of instructor.

CS 664 Graduate Seminar (2)

Topics chosen according to the interests and needs of the students. May be repeated for a maximum of 4 units. Unconditional standing required.

CS 691 Directed Study (1–3)

Individual study program under supervision of master's thesis advisor. Presentation of proposal for thesis in acceptable written form. Must be repeated as appropriate. Total credit, 3 units. Credit assigned upon acceptance of proposal by thesis committee. Open only to unconditional students with approval of thesis advisor.

CS 695 Master's Degree Project (1–2)

Independent work on practical application of an existing methodology or procedure under supervision of a project advisor. Total credit limited to 2 units, but may be repeated until completion. Credit assigned upon successful completion of project and oral presentation. Advancement to Candidacy and approval of project committee required. Prerequisite: Pass or waiver for the GWT and CS 691.

CS 696 Master's Degree Thesis (1–4)

Independent investigation intended to be an extension of an existing body of knowledge. Reporting of research results in an oral presentation and acceptable written form. Must be repeated as appropriate. Credit assigned upon successful completion of thesis and oral presentation. Total credit, 4 units. Advancement to Candidacy and approval of thesis committee required. Prerequisite: CS 691.

CS 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Approval of graduate coordinator is required to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

MATHEMATICS AND STATISTICS

MASTER OF SCIENCE IN MATHEMATICS

In the Department of Mathematics and Statistics, College of Science
www.csupomona.edu/~math

Michael L. Green, Chair
Amber Rosin, Coordinator, Graduate Program

There are four emphases for the Master of Science in Mathematics. The Pure Mathematics emphasis is for individuals whose principal interest is in pure mathematics. It is intended for students who are interested in further graduate study. The Applied Mathematics emphasis is intended for students who wish to learn the applications of mathematics, in particular with a goal of working in industry. This program is also appropriate for the individual seeking the community college teaching credential. The Statistics emphasis is for students interested in working in the statistics field. The Mathematics Education emphasis is intended for students interested in teaching at the secondary and post-secondary level, particularly those interested in mathematics education as a profession.

ADMISSION TO THE PROGRAM

An applicant for admission 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 20 quarter units of upper-division courses in mathematics. 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. Applicants for the Pure Mathematics emphasis must have course work which includes MAT 314, MAT 315, MAT 417, MAT 418 and MAT 428 (or their equivalent). Applicants for the Applied and Statistics emphases must have course work which includes MAT 314, MAT 315, MAT 417 and MAT 428 (or their equivalent). Work experience, as well as undergraduate course work, may be taken into account by the Graduate Committee for credit towards the admission of an applicant.

An upper-division grade point average of at least 3.0 is required for admission as an unconditional 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 the student's admission. An applicant not meeting the minimum standards of the department may be admitted as a conditional student, if space is available. The student must comply with the conditions of admittance within the time stipulated.

Student Program

The student's program will be based upon his/her undergraduate preparation, current interests in mathematics, occupational and professional goals. During the first quarter of residence, each unconditional graduate student will prepare a contract in consultation with the graduate coordinator. This will define all courses and requirements which the student must fulfill to earn the degree. Once approved by the College of Science and verified by the Graduate Studies Office, the study list may be amended only by petition, as outlined in the appropriate sections of this catalog.

Advancement to Candidacy

Advancement to candidacy is required of all students who register for MAT 696 (thesis) or 697 (comprehensive exam). In order to advance to candidacy, a student must:

1. Have an overall GPA of at least B (3.0);
2. Satisfy the GWT requirement;
3. Satisfy all requirements stipulated by the graduate coordinator at the time of admission;
4. Have a contract approved by the graduate coordinator and the Associate Vice President for Graduate Studies;
5. Complete at least 6 courses which appear on the student's contract, 4 of which must be at the 500 level; and
6. Have at least a B (3.0) average on contract courses taken.

REQUIREMENTS

1. Pure Mathematics Emphasis: Either a thesis (three units) and directed readings (two units), or a comprehensive exam (one unit) is required. Those students who take the comprehensive exam must complete at least 45 units of acceptable graduate work in the master's degree program. At least 36 of these units shall be in courses at the graduate level. Those students who write a thesis must complete at least 45 units (which includes the five units of thesis and directed reading) of acceptable graduate work in the master's degree program. At least 33 of these units shall be in courses at the graduate level.
2. Applied Mathematics Emphasis: At least 45 units of acceptable graduate work must be completed in the master's degree program. At least 33 of these units shall be in courses at the graduate level. A thesis (three units) and directed readings (two units) are required.
3. Statistics Emphasis: At least 45 units of acceptable graduate work must be completed in the master's degree program. At least 33 of these units shall be in courses at the graduate level. A thesis (three units) and directed readings (two units) are required.
4. Mathematics Education Emphasis: At least 45 units of acceptable graduate work must be completed in the master's degree program. At least 33 of these units shall be courses at the graduate level. A thesis (3 units) and directed readings (2 units) are required.
5. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extended University (400- level only) may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student. A total limit of 13 transfer, Extended University, or units petitioned for graduate credit may be included on a master's contract. The stipulated time limit of 7 years applies to all of the above.
6. A grade-point average of at least 3.0 shall be maintained in all course work taken to satisfy the degree requirements, as well as in all courses taken at Cal Poly Pomona postbaccalaureate which number 300 or more.
7. The candidate must be enrolled in the university during the quarter of graduation.

Curriculum for Pure Mathematics

The student is required to complete six of the following seven courses: MAT 511, MAT 512, MAT 517, MAT 518, MAT 521, MAT 528, MAT 529. In addition, either a thesis or comprehensive examination is required.

Electives can be graduate or senior level mathematics courses other than MAT 417, MAT 418, MAT 428, MAT 429, and MAT 400 or MAT 499 by petition.

Curriculum for Applied Mathematics

Required courses are MAT 508, 511, 512, 545 and the completion of two courses from each of the following three categories: Category I: MAT 509, MAT 546, MAT 540. Category II: MAT 480, MAT 570, MAT 580. Category III: STA 430, STA 432, STA 530, STA 584, STA 533, STA 534.

Curriculum for Statistics

Required courses are MAT 511, STA 590, and MAT 512 or MAT 508. The student is required to take at least two courses from Category I, at least two courses from Category II, and a minimum of seven courses from all three of Categories I, II, and III. Category I: STA 432, STA 435, STA 533, STA 534, STA 560. Category II: STA 425, STA 430, STA 525, STA 530, MAT 540, STA 584. Category III: STA 440, STA 441, MAT 545, MAT 546, STA 565. In addition, a thesis is required. Electives can be graduate or senior level courses other than MAT 417, MAT 418, MAT 428, and MAT 400 or MAT 499.

Curriculum for Mathematics Education

The student is required to complete the following courses: MAE 590, MAE 591, MAE 593, MAT 511, MAT 517, and MAT 512 OR MAT 518. Also, one of the following courses must be selected: MAE 550, MAE 592, MAE 560, MAT 535. In addition, three of the following courses must be selected with at least one 500 level course from each category. Category I: MAT 512 (if not taken to satisfy the previous requirement), MAT 518 (if not taken to satisfy the previous requirement), MAT 521, MAT 528, MAT 413, MAT 415, MAT 416, MAT 419, MAT 420. Category II: MAT 540, MAT 545, MAT 570, MAT 580, STA 530, STA 533, MAT 401, MAT 431, MAT 470. Finally, a thesis is required.

GRADUATE COURSE DESCRIPTIONS

MAE 560 Problem Solving as a Mathematical Endeavor (4) (even years)

Heuristics and strategies to solve mathematical problems, impact of technology in solving problems and in teaching problem solving, reformulation of problems and problem posing techniques, presentation of outcomes. Introduction to mathematical problem solving literature. 4 lecture/problem. Prerequisite: C or better in MAT 511 or MAT 517.

MAE 590 Acquiring Mathematical Knowledge: Cognitive Dimension (4) F (odd years)

Theoretical foundations of cognitive aspects of mathematics learning including knowledge acquisition construction of knowledge, thinking processes, and forms of communication. Trends in cognitive development and learning strategies. Critical examination of the current research literature concerning cognitive issues related to mathematics education. 4 lectures/problem-solving. Prerequisite: Consent of instructor

MAE 591 Acquiring Mathematical Knowledge: Non-cognitive Dimension (4) W (odd years)

Theoretical foundations of non-cognitive aspects of mathematics learning including personal, classroom, public issues affecting mathematics learning. Incorporation of non-cognitive components into instructional decisions. Critical examination of the current research literature related to issues and policies in mathematics education. 4 lectures/problem-solving. Prerequisites: Consent of instructor, C or better in MAT 590.

MAE 592 Technology in Mathematics Education (4) F (even years)

A study of various technology tools for teaching mathematics. An examination of criteria for evaluation of technical tools, methods of incorporating technology into educational practices, and educational as well as sociopolitical issues related to the use of technology in mathematics education. 4 lectures/problem-solving. Prerequisite: C or better in MAT 492

MAE 593 Research Methods in Mathematics Education (4) Sp (odd years)

Quantitative and qualitative methods of research in mathematics education. An introduction to the research literature. Issues such as analysis of protocols, problems of measurement in evaluation of learning. 4 lectures/problem. Prerequisite: C or better in MAE 590 or consent of instructor.

MAE 594 Topics for Math Educators(4)

Topics related to purpose, method, and scope of assessment in the mathematics education classroom, and to method of instructional design in secondary and post-secondary settings. Exploration of the relationship between assessment and instructional design. 4 lectures/problem-solving. Prerequisite: consent of instructor.

MAE 599/A/L Special Topics in Mathematics Education (4) (odd years)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Lecture/activity/laboratory or combination of these. Prerequisite: consent of instructor.

MAT 508 Numerical Linear Algebra (4) W (even years)

Topics will include numerical methods for determinants, systems of linear equations (direct and iterative methods), matrix inversions, eigenvalues, eigenvectors, techniques to minimize error propagation, splittings, rate of convergence of methods. 4 lectures/problem-solving. Prerequisites: a grade of C or better in MAT 208, MAT 315 and MAT 401 or consent of instructor.

MAT 509 Error Analysis (4) Sp (even years)

Topics will include sources of error, types of error, error propagation, techniques for minimizing error, backward error analysis, approximation of functions, error analysis of iterative methods for non-linear equations. 4 lectures/problem-solving. Prerequisites: a grade of C or better in MAT 401 and 402 or consent of instructor.

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

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, applications. 4 lecture/discussions. Prerequisite: a grade of C or better in MAT 315 or consent of instructor.

MAT 517, 518 Abstract Algebra (4) (4) W, Sp (odd years)

Groups, Sylow theorems, rings and modules, chain conditions, morphism theorems, principal ideal domains, field extensions and finite fields, Galois theory. 4 lecture/discussions. Prerequisite: a grade of C or better in MAT 418 or consent of instructor.

MAT 521 Topology (4) F (even years)

Topological spaces, connectedness, compactness, continuity, separation and countability axioms, metric spaces, product spaces, function spaces and quotient spaces, uniform spaces, paracompactness. 4 lecture discussions. Prerequisite: consent of instructor.

MAT 528, 529 Complex analysis (4) (4) F (odd years) W (even years)

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. 4 lecture/discussions. Prerequisite: MAT 314 or 428 or consent of instructor.

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. 4 lecture discussions. Prerequisite: consent of instructor.

MAT 540 Kalman Filter (4) F (odd years)

Discrete- and continuous-time Kalman Filter. Design, simulation, and implementation; the extended Kalman Filter. Applications to radar, tracking, communication networks, space navigation, social and environmental systems. 4 lectures/problem-solving. Prerequisites: CS 128 or CS 125, MAT 208, MAT 216, STA 241 or STA 326 or consent of instructor.

MAT 545, 546 Modeling (4) (4) W, Sp (odd years)

Modeling of deterministic systems and random processes using ordinary and partial differential equations. Fourier methods, general modeling principles and techniques, perturbation theory and sensitivity analysis, applications. 4 lectures/problem-solving. Prerequisite: consent of instructor.

MAT 550 Seminar in Mathematics (1–4)

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. May be repeated for a maximum of 8 units. 1-4 seminars. Prerequisite: consent of instructor.

MAT 570 Graphs and Network Flows (4) Sp (even years)

Matching theory in graphs and network flows in capacity-constrained networks. Major topics include the Konig-Egervary Theorem for bipartite graphs and the Maximal Flow Algorithm for networks, along with a wide variety of applications. 4 lectures/problem-solving. Prerequisite: MAT 370 or consent of the instructor.

MAT 580 Optimization Theory and Applications (4) F (odd years)

Topics will include convex sets, extrema of functions, convex functions, non-linear convex, quadratic and dynamic programming, applications, primal-dual methods for solving constrained problems, applications to large scale mathematical programming problems. 4 lectures/problem-solving. Prerequisite: a grade of C or better in MAT 480 or consent of instructor.

MAT 599/599A/599L Special Topics for Graduate Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Lecture/Activity/Laboratory/or combination of these. Prerequisite: consent of Instructor.

MAT 691 Directed Study (1)

Individual reading program in an area chosen by the student under the direction and supervision of the faculty. Students must obtain the written permission of the graduate coordinator in order to register for this course. Unconditional standing required. May be repeated for credit, with a maximum of 4 units applied to degree.

MAT 696 Master's Degree Thesis (1)

Independent research and study under supervision of a faculty advisor. Research results must be reported in an acceptable form. Students must obtain the written permission of the graduate coordinator in order to register for this course. Advancement to Candidacy required. May be repeated for credit, with a maximum of 3 units applied to degree.

MAT 697 Comprehensive Examination (1) Credit/no Credit

Preparation for the comprehensive examination. Students must obtain the written permission of the graduate coordinator in order to register for this course. May be taken no more than twice. Failure to complete exam satisfactorily the second time will result in termination from the program. Only applicable with Pure Math subplan. Advancement to Candidacy required.

MAT 699 Master's Degree Continuation (0)

Enrollment in this course allows candidates that have enrolled in the maximum number of thesis or project units to maintain resident status in order to receive university services. Approval of graduate coordinator is required to register for this class. Advancement to candidacy is required. This course is graded on a mandatory credit/no credit basis.

STA 525 Time Series Analysis (4) F (odd year)

Stationary and non-stationary models. Autocorrelation and partial autocorrelation functions. Autoregressive (AR), Moving Average (MA), Autoregressive moving average (ARMA), and Autoregressive integrated moving average (ARIMA) models. Models for seasonal time series. Identification, estimation, diagnostic checking and forecasting. Use of computer package such as SAS or MINITAB. 4 lectures/problem-solving. Prerequisites: C or better in STA 341 or STA 326 or consent or instructor.

STA 530 Random Processes (4) Sp (odd years)

Topics will include second order stationary processes, mean and covariance properties, Gaussian processes, Wiener process and white noise, counting and renewal processes. 4 lectures/problem-solving. Prerequisite: a grade of C or better in STA 241 or STA 326 or consent of instructor.

STA 533 Linear Statistical Models I (4) W (even years)

Introduction to general linear models, distribution of quadratic forms, the Gauss-Markov theorem, estimation, testing the general linear hypothesis. Computer package SAS will be used. 4 lectures/problem-solving. Prerequisite: C or better in STA 432 or consent of instructor.

STA 534 Linear Statistical Models II (4) Sp (even years)

Fixed and random components models, balanced and unbalanced cases, analysis of covariance, components of variance. Computer package SAS will be used. 4 lectures/problem-solving. Prerequisite: C or better in STA 533 or consent of instructor.

STA 560 Advanced Experimental Designs (4)

Incomplete block designs, fractional factorial designs, multifactor experiments with randomization restrictions, response surface methods and designs. 4 lectures/problem-solving. Prerequisite: STA 435 or consent of instructor.

STA 565 Multivariate Analysis (4) W (odd year)

Multivariate distribution. Variance-covariance matrices. Multivariate Normal distribution, Hotelling's T2 distribution. Inference about a mean vector. Discriminant analysis, Principal components, Factor analysis and Clustering. Use of computer package such as SAS or MINITAB. 4

lectures/problem-solving. Prerequisites: C or better in STA 341 or STA 326, and MAT 208 or consent of instructor.

STA 584 Queueing Theory (4) F (even years)

Analysis of queueing systems, discrete and continuous time Markov processes, birth and death processes, equilibrium results for single and multiple server queues, method of stages, priority queues. 4 lectures/problem-solving. Prerequisites: a grade of C or better in STA 430, and STA 341 or STA 441, or consent of instructor.

STA 590 Supervised Statistical Consulting (2)

Use of Statistical Computer Packages and Spreadsheets, Formulation of Statistical/Probabilistic Models, Planning of surveys and experiments, data analysis, report writing and presentation, oral communication with clients, role-playing and group discussions. 2 lecture/problem-solving. Prerequisites: C or better in STA 432 or STA 435 or consent of instructor. May be repeated for a maximum of 4 units of credit.

STA 599/599A/599L Special Topics for Graduate Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Lecture/Activity/Laboratory or combination of these. Prerequisite: consent of Instructor.