

2007-09 Cal Poly Catalog

College of Engineering

Engineering Bldg. (13), Room 266
(805) 756-2131

MS Engineering

with Specializations in:

- Biochemical Engineering
- Bioengineering
- Biomedical Engineering
- Integrated Technology Management
- Materials Engineering
- Water Engineering

MS Engineering

General Characteristics

The Master of Science degree program in Engineering has the following objectives:

- Provide preparation for further study in engineering, leading to the Doctor of Engineering or Ph.D. degree.
- Provide an empowering terminal professional degree for students who intend to become practicing engineers, a degree that not only retains the strong laboratory emphasis and industrial interaction found in the BS curriculum, but which also provides an attractive, efficient educational option to undergraduate students.
- Provide job-entry education for the more complex and evolving interdisciplinary areas of engineering, such as research and development, innovative design, systems analysis and design, bio-engineering, biomedical engineering, manufacturing, mechatronics, and engineering management.
- Update and upgrade opportunities for practicing engineers.
- Allows graduates to maintain currency in their fields.

Prerequisites

For admission as a classified graduate student, an applicant should hold a bachelor's degree in engineering or a closely related physical science with a minimum grade point average of 2.5 in the last 90 quarter units (60 semester units) attempted. Applicants for graduate engineering programs are required to submit scores for the General Test of the Graduate Record Examination. An applicant who meets these standards but lacks prerequisite coursework may be admitted as a conditionally classified student and must make up any deficiencies before advancement to classified graduate standing.

Program of Study

Graduate students must file formal study plans with their advisor, department, college, and university graduate studies office no later than the end of the quarter in which the 12th unit of approved courses is completed.

The formal program of study must include a minimum of 45 units (at least 23 of which must be at the 500 level) with a specialization in one of the following areas: Biochemical Engineering, Bioengineering, Biomedical Engineering,

Integrated Technology Management, Materials Engineering, Water Engineering, or another individualized course of study.

Requirements

The broad curriculum requirements for the Master of Science degree in Engineering are:

- a) a minimum of 24 units in the field of specialization, with at least 18 units at the 500 level;
- b) a minimum of 9 units from an approved list of mathematics, statistics, computer science, or analytic engineering courses, with at least 3 units at the 500 level;
- c) remaining units taken from a list of approved electives;
- d) at least 23 units of the 45 unit program at the 500 level.

In some specializations, two program options are available: a thesis program which requires coursework, a thesis and oral defense of thesis; *or* a non-thesis option which involves additional coursework and a comprehensive examination. The non-thesis option is normally allowed only for those students who have completed a senior project or have had significant engineering project experience.

Joint Programs

The College of Engineering offers two joint programs: in conjunction with the Orfalea College of Business, the MBA/MS Engineering, with a specialization in Engineering Management; and with the College of Architecture and Environmental Design (City and Regional Planning Department), the MCRP/MS Engineering, with a specialization in Transportation Planning.

MS Engineering, Specialization in BIOCHEMICAL ENGINEERING

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| Required Courses | 37 |
| Analytical methods for engineering (6) | |
| Advanced mathematics (3) | |
| ENGR 599 Design Project (Thesis) (2) (2) (5) <i>or</i> | |
| 9 units of approved technical electives <i>and</i> | |
| written comprehensive examination | |
| <i>Select 19 units from the following:</i> | |
| ME 541 Advanced Thermodynamics (4) | |
| ME 552 Advanced Heat Transfer I (4) | |
| ME 553 Advanced Heat Transfer II (4) | |
| ENVE 421 Mass Transfer Operations (3) | |
| ENGR 581, 582, 583 Biochemical Engr (4,4,4) | |
| Approved Electives | 8 |
| | 45 |

MS Engineering, Specialization in BIOENGINEERING

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|--|----|
| Required Courses | 33 |
| ENGR 550 Advanced Topics in Bioengineering (4) | |
| MATE 530 Biomaterials (4) | |
| ENGR 581 Biochemical Engineering I (4) | |
| ENGR 599 Design Project (Thesis) (9) | |

Select 12 units from the following:

- BIO 432, 542
- CSC 471, 473, 474, 541
- ENGR 450, 582
- ENVE 443, 536
- IME 507
- MATE 425, 570
- ME 401, 502, 551, 552, 553, 554
- STAT 512, 542

Approved Engineering Electives $\frac{12}{45}$

MS Engineering, Specialization in BIOMEDICAL ENGINEERING

Required Courses 27

- BMED 450 Special Topics in Bioengineering (4)
- BMED 460 Engineering Physiology (4)
- BMED 530 Biomaterials (4)
- BMED 550 Advanced Topics in Bioengineering (4)
- BMED 563 Biomedical Engineering Graduate Seminar (2)
- BMED 599 Design Project (Thesis) (9) (BMED 591/592 substitute for 2 or 4 units of BMED 599)

Approved Engineering, Science and Mathematics Electives $\frac{18}{45}$

MS Engineering, Specialization in INTEGRATED TECHNOLOGY MANAGEMENT

The program goal is to develop "industry ready" graduates who will be integrators of engineering disciplines, industry concerns, and technology management. Many of the program courses involve actual integrated problems or opportunities from industrial organizations in a collaborative learning environment.

Required Courses 29/30

- IME 430 Quality Engineering (4)
- IME 503 Applied Stat. Analysis for Engineers (4)
- IME 507 Graduate Seminar (2)(2)
- IME 556 Technological Project Management (4)
- IME 580 Manufacturing Systems (4)
- IME 596 Team Project/Internship (10) or IME 599 Design Project/Thesis (9)

Approved Electives $\frac{16}{45}$

MS Engineering, Specialization in MATERIALS ENGINEERING

Required Courses 27

- MATE 599 Design Project (Thesis) (2) (2) (5)

Select 18 units from the following:

- MATE 425 Corrosion Engineering (4)
- MATE 430 Microfabrication (3)
- MATE 440 Welding Metal/Joining Adv Matls (3)

- MATE/CHEM 446 Surface Chemistry of Materials (3)
- MATE 504 Research/Dev in Materials Engr (4)
- MATE 510 Materials Analysis (4)
- MATE 520 X-Ray Diffraction (3)
- MATE 550 Micro Systems Design & Manuf. (4)
- MATE 570 Advanced Engineering Materials (4)
- BMED 530 Biomaterials (4)

Approved Electives $\frac{18}{45}$

MS Engineering, Specialization in WATER ENGINEERING

Required Courses 35

- Analytical methods for engineering (6)
- Advanced mathematics (3)
- ECON 410 Public Finance/Cost-Benefit Analysis (4)
- BRAE 435/BRAE 414/BRAE 440 (3)
- BRAE 533 Irrigation Project Design (4)
- CE 533 Adv Water Resources Engineering (3)
- CE 573 Public Works Administration (3)
- BRAE/CE 599 Design Project (Thesis) (2) (2) (5) or 9 units of approved technical electives and written comprehensive examination

Approved Elective Courses 10

Select 10 units from the following:

- BRAE 414, 437, 440, 533;
- CE 434, 440; ENVE 438, 439, 535

45