Program

BS in Manufacturing Technology
Minor in Manufacturing

This multidisciplinary program is designed to prepare men and women to meet the growing need for manufacturing professionals. The curriculum emphasizes laboratory experiences organized to provide students with a working knowledge of traditional and computer-aided design and production tools. The program is built on a foundation of lower-division math, science, economics, and manufacturing concepts. Upper-division manufacturing technology (MFGT) classes integrate the foundation into a unified body of knowledge on the management of materials, processes, costs, and personnel. In addition to this core curriculum, the program currently offers a range of lab courses in three high demand areas: Computer-Integrated Manufacturing, Metals Processing, Polymer/Plastics Processing.

The Minor in Manufacturing is specially designed to complement business and engineering majors.

The Manufacturing Technology Program is professionally accredited by the National Association of Industrial Technology (NAIT) and the Foundry Educational Foundation (FEF).

Career Outlook

Job opportunities are available throughout the manufacturing sector—in large and small, local and national organizations involved in the full range of operations—from research and development through mass production. Although the program is designed to educate students as technical managers, graduates are employed in numerous capacities. Starting salaries for MFGT graduates in 2003 averaged $55,000 per year for these representative entry-level positions:

Applications/Manufacturing Engineer
Manufacturing Manager
Project Manager
Production Planner/Supervisor/Manager
Quality Assurance Specialist
Technician
Technical Sales Representative
Tooling Designer
Vocational Instructor

Industrial Support

Many organizations actively support the program by sponsoring projects, funding research, donating equipment and materials, and hiring students. The program’s partners are exemplified by the Manufacturing Technology Advisory Board. Its members provide direction and guidance from their vantage point as senior managers in industry.

Student Organizations

Student chapters of professional organizations play a key role in developing well-rounded individuals with leadership, managerial, social, and technical skills. The most active groups in the program are:

Society of Manufacturing Engineers (SME)
Society of Plastics Engineers (SPE)

These student organizations arrange and sponsor guest speakers, field trips, social activities, and professional certification exams. Manufacturing students also compete and excel in regional and national design and fabrication competitions.

Scholarships

In addition to university-wide scholarships, Manufacturing students are eligible for twelve to fifteen special scholarships each year. The individual awards range from $100 to $1000 and are based on academic performance/improvement, participation in activities, leadership qualities, and/or financial need.

Internships

On-campus work experience is available through a limited number of part-time production jobs and sponsored projects in the program’s labs. Many students also take advantage of cooperative education/internship opportunities available through the university’s Office of Experiential Education. These are full-time, semester and/or summer positions with well-known companies. Participants gain professional experience, earn salaries of $2500-$3500 per month as well as upper-division course credit.
THE BACHELOR OF SCIENCE
IN MANUFACTURING TECHNOLOGY

The manufacturing technology faculty are committed to preparing graduates for a variety of manufacturing careers, ranging from research and development to mass production. The faculty provide students with a broad undergraduate experience in math, science, business, and the humanities, as well as laboratory courses with a practical, applications orientation. The knowledge and skills gained will enable students to qualify to become Certified Manufacturing Technologists (CMfgT) after passing a comprehensive examination administered by the Society of Manufacturing Engineers (SME).

Manufacturing Technology Program Goals

The program’s objectives are best framed in terms of the following goals for its graduates:

1. First and foremost, CSU, Chico manufacturing technology graduates will have a thorough understanding of how products are designed, produced, and tested.
2. They will have a thorough understanding of contemporary manufacturing processes, particularly for parts consisting of metals and polymers.
3. They will understand the fundamental behavior of various materials and the testing used to determine material properties.
4. They will have an understanding of project management, quality assurance methods, and the economic issues involved in manufacturing.
5. They will be familiar with contemporary computer applications and process automation, including the use of sensors, actuators, and controllers to automate machines and processes.
6. They will be practiced at communicating their ideas in oral, written, and graphical form.
7. They will be able to function effectively as team members.
8. They will develop an appreciation for the individual, society, and human heritage, and they should be aware of the impact of their products on humankind and the environment.

Total Course Requirements for the Bachelor’s Degree: 128 units

See “Requirements for the Bachelor’s Degree” in The University Catalog for complete details on general degree requirements. A minimum of 40 units, including those required for the major, must be upper division.

A suggested Major Academic Plan (MAP) has been prepared to help students meet all graduation requirements within four years. Please request a plan from your major adviser or view it and other current advising information on the CSU, Chico Web.

General Education Requirement

Manufacturing Technology is a major with modifications to the university’s General Education Requirements. The following requirements, together with the approved General Education courses (marked with an * below), fulfill the General Education Requirement.

1. Select three courses, one from each of Core Areas A1, A2, and A3.
2. Select one course from Breadth Area B2.
3. Select one course from Breadth Area C1 or C2 or C3.
4. Select one course from Breadth Area E.
5. Select two courses from the same Upper-Division Theme. (Consult with an adviser or the Class Schedule to determine which two courses in the theme you select meet the Upper-Division Theme Requirement for Manufacturing Technology majors.)

Cultural Diversity Requirement: 6 units

Complete two Cultural Diversity courses, one Ethnic and one Non-Western. (See the “Bachelor’s Degree Requirements” section.) Both courses must also satisfy one of the General Education requirements in order for 128 units to fulfill all requirements for the Manufacturing Technology degree.

American Institutions Requirement: 6 units

This requirement is normally fulfilled by completing HIST 130 and POLS 155. For other alternatives, see the “Bachelor’s Degree Requirements” section.

Literacy Requirement:

See “Mathematics and Writing Requirements” in The University Catalog. Writing proficiency in the major is a graduation requirement and may be demonstrated through satisfactory completion of a course in your major which has been designated as the Writing Proficiency (WP) course for the semester in which you take the course. Students who earn below a C- are required to repeat the course and earn a C- or better to receive WP credit. See The Class Schedule for the designated WP courses for each semester. You must pass ENGL 130 (or its equivalent) with a C- or better before you may register for a WP course.

Course Requirements for the Major: 98 units

The following courses, or their approved transfer equivalents, are required of all candidates for this degree.

Lower-Division Requirements: 53 units

17 courses required:

- ACCT 201 Intro to Financial Accounting 3.0 FS
- CHEM 107 Gen Chem for Applied Sciences 4.0 FS *
- Prerequisites: Intermediate Algebra.
- CHEM 108 Organic Chem for Applied Sci 4.0 FS
- Prerequisites: CHEM 107 or CHEM 111 or equivalent.
- ECON 102 Principles of Macro Analysis 3.0 FS *
- ECON 103 Principles of Micro Analysis 3.0 FS *
- EECE 110 Basic Electricity/Instruments 3.0 FS
- Prerequisites: None. This course is not intended for engineering majors.
- MATH 105 Statistics 3.0 FS *
- Prerequisites: Completion of ELM requirement.
- MATH 119 Precalculus Mathematics 4.0 FS *
- Prerequisites: Completion of ELM requirement, and either 1/2 year of high school trigonometry or MATH 118.
- MECHE 100 Graphics I 2.0 FS
- MECHE 200 Graphics II 2.0 FS
- Prerequisites: MECHE 100.
- MFGT 160 Intro Manufacturing Engineering 3.0 FS
- MFGT 201 Graphics Applications for Mfg 2.0 SP
- Prerequisites: MATH 105, MECHE 200.
- MFGT 216 Introduction to Plastics 3.0 FA
- Prerequisites: CHEM 107, Recommended: CHEM 108, MATH 105.
- MFGT 218 Polymer Materials 3.0 FA
- Prerequisites: Either MECHE 210 or MFGT 216, Recommended: CHEM 108.
- MFGT 260 Material Removal 3.0 FA
- Prerequisites: MFGT 160, Recommended: PHYS 202A.
- PHYS 202A General Physics 4.0 FS *
- Prerequisites: High school physics or faculty permission. High school trigonometry and second-year high school algebra or equivalent (MATH 051 and MATH 118 at CSU, Chico).
- PHYS 202B General Physics 4.0 FS
- Prerequisites: PHYS 202A.

Upper-Division Requirements: 45 units

12 courses required:

- ACCT 310 Materials & Quality Testing 3.0 SP
- Prerequisites: MFGT 160, MFGT 216. Recommended: MATH 119, PHYS 202A.
- MFGT 350 Industrial Supervision 3.0 SP
- Prerequisites: Junior standing.
- MFGT 352 Industrial Safety Management 4.0 SP WP
- Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher, junior standing.
- MFGT 360 Computer-Aided Manufact CAM 4.0 FA
- Prerequisites: MFGT 201, MFGT 260.
- MFGT 386 Manufact Automation Systems 3.0 FA
- Prerequisites: ECE 110, MFGT 360.
- MFGT 454 Advanced Laboratory Practices 2.0 FS
- Prerequisites: Senior standing, faculty permission.
- MFGT 458 Capstone A: Project Management 3.0 FA
- Prerequisites: Senior standing.
- MFGT 464 Fluid Metallurgy 3.0 SP
- Prerequisites: MFGT 310, Recommended: MFGT 360.
- MFGT 468 Capstone B: Manufact Tooling 4.0 SP
- Prerequisites: MFGT 218, MFGT 360, MFGT 458.
- MFGT 490 Manufact Fundamentals & Pract 1.0 SP
- Prerequisites: Graduation in MFGT expected within 12 months.
- SCMS 306 Operations Management 3.0 FS
- Prerequisites: Business Administration or Business Information Systems status required for business majors. Completion of General Education Breadth Area A4 requirements required for all majors.
- SCMS 441 Quality Management 3.0 FS
- Prerequisites: SCMS 306 or faculty permission.
1 course selected from:
- SCMS 442 Prod Plan & Inventory Control 3.0 FS
- Prerequisites: SCMS 306.
- SCMS 443 Prod Mgmt & Control Systems 3.0 FS
- Prerequisites: SCMS 306.

2 courses selected from:
- MFGT 362 Material Joining 3.0 Inq
  - Prerequisites: MFGT 160.
- MFGT 370 Plastics Processing & Manufact 3.0 SP
  - Prerequisites: MFGT 216.
- MFGT 372 Composites Material/Processing 3.0 Inq
  - Prerequisites: MFGT 218.
- MFGT 389 Industrial Internship 1.0-6.0 FS
  - Prerequisites: Approval of faculty internship coordinator prior to off-campus assignment.
- MFGT 472 Advanced Composites 3.0 Inq
  - Prerequisites: MFGT 218.
- MFGT 474 Polymer Flow Analysis 3.0 Inq
  - Prerequisites: MFGT 218.
- MFGT 476 Polymer Design and Tooling 3.0 Inq
  - Prerequisites: MFGT 218, MFGT 360. Recommended: MFGT 474.
- MFGT 478 Elastomers 3.0 Inq
  - Prerequisites: MFGT 218.
- MFGT 444 Concurrent Engineering 3.0 Inq
  - Prerequisites: MECH 102, MFGT 160.

Grading Requirement:
All courses taken to fulfill major course requirements must be taken for a letter grade except those courses specified by the department as Credit/No Credit grading only.

Advising Requirement:
Advising is mandatory for all majors in this degree program. Consult your undergraduate adviser for specific information.

THE MINOR IN MANUFACTURING
Course Requirements for the Minor: 23-25 units
The following courses, or their approved transfer equivalents, are required of all candidates for this minor.

3 courses required:
- MFGT 160 Intro Manufact Engineering 3.0 FS
  - Prerequisites: Business Administration of Business Information Systems status required for business majors. Completion of General Education Breadth Area A4 requirements required for all majors.
- SCMS 441 Quality Management 3.0 FS
  - Prerequisites: SCMS 306 or faculty permission.

1 course selected from:
- MECH 100 Graphics I 2.0 FS
- MECH 102 Graphics for Civil Engineers 2.0 FS

1 course selected from:
- MATH 107 Finite Math for Business 3.0 FS *
  - Prerequisites: Completion of ELM requirement.
- MATH 119 Precalculus Mathematics 4.0 FS *
  - Prerequisites: Completion of ELM requirement, and either 1/2 year of high school trigonometry or MATH 118.
- MATH 120 Analytic Geometry and Calculus 4.0 FS *
  - Prerequisites: Completion of ELM requirement; both MATH 118 and MATH 119 (or high school equivalent); a score that meets department guidelines on a department administered calculus readiness exam.

1 course selected from:
- BADM 103 Statistics of Business & Econ 3.0 FS
  - Prerequisites: For Business Administration majors: MATH 107.
  - For others: Completion of General Education Breadth Area A4 requirement.
- CIVL 302 Engineering Econ & Statistics 3.0 FS
  - Prerequisites: MATH 121, junior standing.
- MATH 105 Statistics 3.0 FS *
  - Prerequisites: Completion of ELM requirement.
- MATH 108 Statistics of Business & Econ 3.0 FS
  - For business administration students: MATH 107.
  - For other students: completion of General Education Breadth Area A4 requirement.

1 course selected from:
- MECH 440A Mech Engr Design Project I 3.0 FA WP
  - Prerequisites: ENGL 130 for its equivalent with a grade of C- or higher, MECH 140, MECH 200, MECH 340, MFGT 160. Recommended: CIVL 302, MECA 380, MECH 308, MECH 338.
- MEGA 440A Mechatronic Engr Design Proj I 3.0 FA WP
  - Prerequisites: ENGL 130 for its equivalent with a grade of C- or higher; ECE 444, MECH 340, MFGT 160. Recommended: CIVL 302, MECA 380.
- MFGT 350 Industrial Supervision 3.0 SP
  - Prerequisites: Junior standing.
- SCMS 443 Prod Mgmt & Control Systems 3.0 FS
  - Prerequisites: SCMS 306.

1-2 courses selected from:
- MFGT 216 Introduction to Plastics 3.0 FA
  - Prerequisites: CHEM 107. Recommended: CHEM 108, MATH 105.
- MFGT 260 Material Removal 3.0 FA
  - Prerequisites: MFGT 160. Recommended: PHYS 202A.
OR (the following course may be substituted for the above)
- MECH 200 Graphics II 2.0 FS
  - Prerequisites: MECH 100.
AND (Both the above and following course must be taken)
- MFGT 201 Graphics Applications for Mfg 2.0 SP
  - Prerequisites: MATH 105, MECH 200.

The Faculty
Manufacturing Technology
Leonard Fallscheir, 1979, Assoc Professor, MA, CSU Chico.
Joseph Paul Greene, 1998, Professor, PhD, U Michigan.
Dirk Vanderloop, 1997, Lecturer C, DPA, USC.
Emertius Faculty
Robert W. Donoho, 1970, Professor Emeritus, PhD, Kansas St.
Ronald Hall, 1968, Professor Emeritus, EdD, Arizona State Univ.
R. Lee Koenig, 1986, Professor Emeritus, MA, CSU/SI.
George P. Waldheim, 1985, Professor Emeritus, EdD, SUNY Buffalo.
Jesse D. Wallace, 1958, Professor Emeritus, MA, U Missouri.

Manufacturing Technology Course Offerings
Please see the section on “Course Description Symbols and Terms” in The University Catalog for an explanation of course description terminology and symbols, the course numbering system, and course credit units. All courses are lecture and discussion and employ letter grading unless otherwise stated. Some prerequisites may be waived with faculty permission. Many syllabi are available on the Chico Web.

MFGT 160 Introduction to Manufacturing Engineering 3.0 Fa/Spr
This course is designed to familiarize the student with the basic concepts of manufacturing engineering, i.e., an understanding of the common manufacturing materials and processes, and the knowledge to solve manufacturing problems. 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see Course Schedule. Formerly MFGT 051.

MFGT 198 Special Topic 1.0-3.0 Inq
Prerequisites: To be established when course is formulated. Special topic generally offered one time only. Different sections may have different topics. See The Class Schedule for specific topic being offered. Formerly MFGT 098.

MFGT 201 Graphics Applications for Manufacturing 2.0 Spring
Prerequisites: MATH 105, MECH 200.
Advanced solid modeling techniques, quality assurance (inspection, metrology, coordinate measuring machines, statistical process control, six sigma), and design considerations (design for manufacturing, rapid prototyping). 1.0 hour discussion, 3.0 hours laboratory. Formerly MFGT 201.

MFGT 216 Introduction to Plastics 3.0 Fall
Prerequisites: CHEM 107. Recommended: CHEM 108, MATH 105.
Survey of polymer chemistry, mechanical properties, and industrial processing of thermoplastics. 2.0 hours discussion, 3.0 hours laboratory. Formerly MFGT 041.
MFGT 218 Polymer Materials 3.0 Fall
Prerequisites: Either MECH 210 or MFGT 216. Recommended: CHEM 108. Study of engineering thermoplastic materials, thermoplastic blends, elastomers, and thermoset composites. Investigation of injection molding, and structural foam. Introduction to plastic flow analysis. 2.0 hours discussion, 3.0 hours laboratory. Formerly MFGT 141.

MFGT 260 Material Removal 3.0 Fall
Prerequisites: MFGT 160. Recommended: PHYS 202A. A study of the industrial applications of material-removal technology. Emphasis will be placed on the management of the application of the technology. Units involving the physics of metal-cutting, cutting-tool materials and geometry, conventional and semi-automatic machine tools, and cost-estimating are included. 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly MFGT 054.

MFGT 298 Special Topic 3.0 Inquire
Prerequisites: To be established when course is formulated. Special topic generally offered one time only. Different sections may have different topics. See The Class Schedule for specific topic being offered. Formerly MFGT 195.

MFGT 310 Materials and Quality Testing 3.0 Spring
Prerequisites: MFGT 216. Recommended: MATH 119, PHYS 202A. Study of the manufacturing, processing, applications, and testing of common industrial materials, including metals, polymers, ceramics, and composites. 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly MFGT 104.

MFGT 350 Industrial Supervision 3.0 Spring
Prerequisites: Junior standing. Current supervisory and managerial procedures used in industry for supervisors, managers, field and sales representatives, and inspectors. Formerly MFGT 216.

MFGT 352 Industrial Safety Management 4.0 Spring
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher, junior standing. A study of effective industrial safety management practice and the philosophy and principles of industrial accident prevention. Coverage includes examination of current industrial safety practices and federal and state programs designed to improve safety in an industrial environment. Instruction in effective technical safety documentation — gathering, organizing, and reporting industrial safety data. This is a writing proficiency, WP, course; a grade of C- or better certifies writing proficiency for majors. Formerly MFGT 210.

MFGT 360 Computer-Aided Manufacturing (CAM) 4.0 Fall
Prerequisites: ENGL 130 (or its equivalent) with a grade of C- or higher, junior standing. A study of the concepts involved in programming computer numerically controlled (CNC) machines. This course includes integration of computer-aided manufacturing (CAD/CAM). 3.0 hours discussion, 3.0 hours laboratory. Formerly MFGT 156.

MFGT 362 Material Joining 3.0 Inquire
Prerequisites: MFGT 160. A study of the industrial applications of material-joining technology directed toward managing the applications of the processes. Units involving adhesive bonding, mechanical fasteners, and welding are included, along with metalurgy, specimen testing, and cost estimating. 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly MFGT 152.

MFGT 370 Plastics Processing and Manufacturing 3.0 Spring
Prerequisites: MFGT 216. Study of plastics manufacturing, plastics processing, plastics compounding, plastic flow analysis, gating systems, tool design, data acquisition, experimental design, tooling, and processing equipment for injection molding, extrusion, compression molding, rotational molding, and transfer molding. 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly MFGT 142.

MFGT 372 Composite Materials & Processing 3.0 Inquire
Prerequisites: MFGT 218. Study of thermoplastic and thermoset composites and materials and processing with epoxy, polyester, and polyurethane reinforced with glass, kevlar, carbon fiber, and cored materials. Introduction to composites tool design and processing, including compression molding, resin transfer molding, hand lay-up, and vacuum assisted molding. 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly MFGT 147.

MFGT 386 Manufacturing Automation Systems 3.0 Fall
Prerequisites: ECE 110, MFGT 360. A study of the programming and function of industrial robots and other automation systems used in modern manufacturing environments. Concepts include effector design, material movement, storage and retrieval systems, programmable logic controllers, and vision systems. Lecture, demonstrations, and laboratory exercises designed to promote understanding of manufacturing automation. 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly MFGT 232.

MFGT 389 Industrial Internship 1.0-6.0 Fa/Spr
Prerequisites: Approval of faculty internship coordinator prior to off-campus assignment. Manufacturing experience in an industrial setting which provides an opportunity to apply academic learning to professional practice. Minimum duration of 400 hours of work under the direct supervision of an on-site manufacturing supervisor. On completion of the internship, a written report prepared under the direction of a faculty member is required. May be taken only once for credit. You may take this course more than once for a maximum of 15.0 units. Credit/no credit grading only. Formerly MFGT 289.

MFGT 398 Special Topic 1.0-4.0 Inquire
Prerequisites: To be established when course is formulated. Special topic generally offered one time only. Different sections may have different topics. See The Class Schedule for the specific topic being offered. Normally taught by professionals from the field. Formerly MFGT 198.

MFGT 399 Special Problems 1.0-3.0 Inquire
Prerequisites: Approval of supervising faculty member. Independent study of a special problem. See department office for registration procedure. You may take this course more than once for a maximum of 6.0 units. Credit/no credit grading only. Formerly MFGT 199.

MFGT 444 Concurrent Engineering 3.0 Inquire
Prerequisites: MECH 102, MFGT 160. A study of the concepts of concurrent product and process design using computer-aided design, computer-aided engineering, and computer-aided manufacturing techniques (CAD/CAE/CAM). Focus will be primarily on the design and manufacture of mechanical parts and assemblies, including the use of rapid prototyping and rapid inspection. 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly MFGT 258.

MFGT 454 Advanced Laboratory Practices 2.0 Fa/Spr
Prerequisites: Senior standing, faculty permission. Provides advanced and qualified students an opportunity to do individual special interest study and practice toward gaining proficiencies in the student's area of specialization. You may take this course more than once for a maximum of 6.0 units. Formerly MFGT 257.

MFGT 458 Capstone A: Project Management 3.0 Fall
Prerequisites: Senior standing. This course familiarizes students with techniques for managing technical projects while they design, plan, and implement a capstone manufacturing project through the mock-up stage, to be continued in MFGT 468. Students work in groups on projects of mutual interest to gain experience in planning and updating schedules. Students learn to define requirements, estimate and manage resources, and structure decisions and trade-offs. Emphasis is placed on group dynamics in communication and problem solving. 2.0 hours discussion, 2.0 hours activity. Special fee required; see The Class Schedule. Formerly MFGT 241.

MFGT 464 Fluid Metallurgy 3.0 Spring
Prerequisites: MFGT 310. Recommended: MFGT 360. A study of metal-casting technologies directed at the management of a metal-casting plant. 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly MFGT 280.

MFGT 468 Capstone B: Manufacturing Tooling 4.0 Spring
Prerequisites: MFGT 218, MFGT 360, MFGT 458. Continuation of the capstone manufacturing project from MFGT 458. Students design, fabricate, test, and evaluate production tooling used in the manufacture or assembly of metal or plastic parts in their capstone projects. Must be taken the semester immediately following MFGT 458. 2.0 hours discussion, 6.0 hours laboratory. Special fee required; see The Class Schedule. Formerly MFGT 283.

MFGT 472 Advanced Composites 3.0 Inquire
Prerequisites: MFGT 218. Investigation of aerospace composite materials and processing, including vinyl esters, polyesters, epoxy, kevlar, metal matrix composites, ceramic composites, composite tooling and design, 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly MFGT 247.
MFGT 474 Polymer Flow Analysis 3.0 Inquire
Prerequisites: MFGT 218.
Investigation of flow simulation for injection molding using C-Mold and Moldflow CAE computer programs, and an introduction to finite element methods and analysis principles. 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly MFGT 242.

MFGT 476 Polymer Design and Tooling 3.0 Inquire
Prerequisites: MFGT 218, MFGT 360. Recommended: MFGT 474.
Investigation of polymer design principles and tooling standards for injection molding, blow molding, and extrusion. Development and construction of injection molding and extrusion dies using computer analysis programs and metal removal machines. 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly MFGT 243.

MFGT 478 Elastomers 3.0 Inquire
Prerequisites: MFGT 218.
Study of rubber-like materials, including thermoplastic rubbers, thermoset rubbers, silicones, thermoplastic elastomers, and urethanes. Investigation of tooling and processing of elastomers. 2.0 hours discussion, 3.0 hours laboratory. Special fee required; see The Class Schedule. Formerly MFGT 246.

MFGT 490 Manufacturing Fundamentals and Practice 1.0 Spring
Prerequisites: Graduation in MFGT expected within 12 months. Review of manufacturing technology fundamentals and foundation for professional practice. Current topics in manufacturing. Preparation and encouragement for the Fundamentals of Manufacturing Examination. 2.0 hours activity. Credit/no credit grading only. Formerly MFGT 290.

MFGT 498 Special Topic 1.0-3.0 Inquire
Prerequisites: To be established when course is formulated.
Special topic generally offered one time only. Different sections may have different topics. See The Class Schedule for the specific topic being offered. This course is normally taught by professionals from the field. Formerly MFGT 298.

MFGT 499 Special Problems 1.0-3.0 Inquire
Prerequisites: Approval of supervising faculty member.
Independent study of a special problem. See department office for registration procedure. You may take this course more than once for a maximum of 6.0 units. Credit/no credit grading only. Formerly MFGT 299.

MFGT 499H Honors Project 3.0 Inquire
Prerequisites: Completion of 12 units of upper-division MFGT courses, faculty permission.
Open by invitation to MFGT majors who have a GPA among the top five percent of MFGT students, based on courses taken at CSU, Chico. This is an Honors in the Major course; a grade of B or better in 6 units of MFGT 499H certifies the designation of "Honors in the Major" to be printed on the transcript and the diploma. It taken twice, prerequisite to the second semester is a grade of B or better in the first semester. Each 3-unit course will require both formal written and oral presentations. You may take this course more than once for a maximum of 6.0 units. Formerly MFGT 299H.

MFGT 697 Independent Study 1.0-6.0 Inquire
Prerequisites: Approval from supervising faculty member.
This is a graduate-level independent study offered for 1.0-3.0 units. You may take this course more than once for a maximum of 6.0 units. Formerly MFGT 398C.

MFGT 698 Advanced Topic 1.0-3.0 Inquire
Prerequisites: To be established when course is formulated.
This course is for special topics offered for 1.0-3.0 units. Typically a topic is offered on a one-time-only basis and topics vary from term to term and from section to section. See The Class Schedule for the specific topics being offered. You may take this course more than once for a maximum of 3.0 units. Formerly MFGT 397.

MFGT 699P Master's Project 1.0-3.0 Fa/Spr
Prerequisites: Approval from supervising faculty member.
Independent study of a special problem approved by student's graduate advisory committee. See the department office for registration procedures. You may take this course more than once for a maximum of 6.0 units. Formerly MFGT 399P.

MFGT 699T Master's Thesis 1.0-6.0 Inquire
Prerequisites: Approval from supervising faculty member.
Independent study leading to a Master's Thesis of a special problem approved by the student's graduate advisory committee. See the department office for registration procedures. You may take this course more than once for a maximum of 6.0 units. Formerly MFGT 399P.