CASC 6012. Clothing Construction-Multi-Level

CASC 6014. Fashion Sewing and Alteration
Development of skills in clothing construction. Areas include tailoring, dressmaking, fitting, alterations. Students provide materials and supplies.

CASC 6025. Quiltmaking
Prereq.: ABE 2071
Develop/improve skills in sewing, design, pattern drafting, applique, patchwork and quilting. Beginning students construct a sampler quilt. Intermediate/advanced students work on individually designed projects.

CASC 6027. Surface Design - 3-dimensional
Applications of design on fabric via painting silk screening, airbrushing, stenciling, blueprinting, marbleizing and sculpting. Pattern drafting for 3 dimensional objects: figures, animals, boxes, masks, headaddresses and footwear. Emphasis on color and design.

CASC 6040. Interior Textiles
Lab-2; field trips
Prereq.: CASC 6006
Adviser: CASC 70 (concur.)
Woven structures used in interior furnishings. Practice techniques of upholstery, drapery, rugs, bed coverings, wall weavings and table matings. Relationship to commercial production of these products is emphasized. A notebook with sample woven presentations is recommended.

CASC 6050. Lingerie (70 hrs)
Basic underwear design principles will be examined as they apply to men and women and children. This will include design modifications based on individual creativeness, body shape, figure accents, and selection of fabrics and notions. Course will focus on both consumer and industrial production.

CASC 6051. Millinery
All aspects of basic hat making, including sewn hats, framed hats, straw hats, and felt hats. Application of trims and embellishments included.

CASC 6052. Apparel Art (35 hrs)
Prereq.: CASC 6012
Adviser: CASC 71 (concur.)

CASC 6055. Upholstery Trade
Upholstering as a trade. Focusing on the skills necessary for upholstering new and existing residential and commercial upholstered furniture. Upholstering as a professional business - wholesale or retail, including fabric and pattern layout, sewing.

Consumer Education
Announcement of Courses

NONCREDIT COURSE:
HOEC 6122. Consumer Education - Health and Nutrition
Includes the practices for maintaining good health, well-being and physical fitness. Information on nutrition and personal safety.

Dental Assisting
Announcement of Curricula

Degree Curriculum
Training in the curriculum in Dental Assisting is designed to prepare students for employment as Registered and Certified Dental Assistants in private practice, specialty dentistry, hospitals, clinics and dental schools. Positions to which graduates may advance with experience and further training include those of dental product sales representative, insurance auditor, manager, supervisor and educator. This program includes instruction in intra-oral dental functions and direct patient care/chairside experience in dental schools, clinics and private offices and public dental care facilities in San Francisco and the Daly City/South San Francisco area. Students who have completed their training satisfactorily are qualified to take the state licensure examination to become Registered Dental Assistants and the national licensure examination to become Certified Dental Assistants.

Accreditation. The program in Dental Assisting is accredited by the American Dental Association’s Commission on Dental Accreditation, a specialized accrediting body recognized by the Council on Postsecondary Accreditation and by the United States Department of Education, and is accredited by the Board of Dental Examiners, Department of Consumer Affairs, State of California.

Course of Study. The two-year course of study includes instruction in traditional four-handed dental assisting techniques and in the legally allowed intra-oral functions delegated to a registered dental assistant. Courses in dental anatomy, dental material, radiography, and preventive dentistry are prerequisites to clinical instruction. The clinical phase of the curriculum utilizes the School of Dentistry at the University of California, San Francisco; the School of Dentistry of the University of the Pacific at San Francisco; affiliated hospital clinics; and selected private dental offices.

Associate in Science Degree. The curriculum is designed so that students may satisfy the requirements for graduation from the College and receive the degree of Associate in Science.

Information Regarding Admission. Requests concerning admission should be addressed as follows: Department Head, Dental Assisting, Box L-240, City College of San Francisco, 50 Phelan Avenue, San Francisco, California 94112.
Consideration for Admission to the Curriculum. The curriculum in Dental Assisting, offered to new applicants in the fall semester only, is open to all interested students who fulfill the following admission requirements:

1. Be in good physical and mental health.

2. Eligibility for admission to CCSF. (See in this catalog the Admission to College - Admission Open to High School Graduates and Others).

3. Complete the Program’s application and health history forms and submit to the Dental Assisting Program’s office.

Advanced Placement. Applicants who have been admitted to the curriculum and who have previous education or experience in dental assisting may apply for credit and advanced placement in the curriculum. However, such applicants should first have completed the science, English and keyboard requirements.

Bases for Disqualification. Students who receive a final grade lower than C in any dental assisting course will be disqualified from continuing in the curriculum. Students who receive a final grade lower than C will be permitted to repeat a course only once and must achieve a grade of C at all evaluation periods. Students who repeat a course and who do not achieve a grade of C at an evaluation period will be disqualified from continuing in the curriculum. Students may also be disqualified for other reasons consistent with College policy.

Award of Achievement. Students who have satisfied the requirements for graduation from the College and who have completed the curriculum with an average final grade of C plus (2.50 grade-point average) or higher receive the Award of Achievement in Dental Assisting.

Eligibility for the Certification Examination and Licensure Examinations. Graduates who receive an Award of Achievement or a Certificate of Completion are eligible to take the Certification Examination given by the Dental Assisting National Board and the Licensure Examinations to become a Registered Dental Assistant given by the Board of Dental Examiners.

Courses Required for the Award of Achievement in Dental Assisting

First Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 9† Hum Bio.................</td>
<td>4</td>
</tr>
<tr>
<td>DENT 51 Applied Dental Science</td>
<td>4</td>
</tr>
<tr>
<td>DENT 55A Dent Roentgenography</td>
<td>2</td>
</tr>
<tr>
<td>DENT 62 Dent Assisting in Practice</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 90 or ESL 72 Basic Comp or Inter Comp</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 1 or 26 Gen Psychology or Hum Relation .....</td>
<td>3</td>
</tr>
</tbody>
</table>

Additional graduation requirements

† Zooll 10, ANAT 14 or 25, or PHYS 12 may be substituted for BIO 9.

Second Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 79A Speed Building-Typing</td>
<td>1</td>
</tr>
<tr>
<td>DENT 55B Dental Roentgenography</td>
<td>2</td>
</tr>
<tr>
<td>DENT 57 Dental-Office Management</td>
<td>3</td>
</tr>
</tbody>
</table>

Additional graduation requirements

† Computer data entry courses may be substituted for BUS 79A.

Third Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENT 52 Intro to Dental Procedures</td>
<td>3</td>
</tr>
<tr>
<td>DENT 53 Intro to Chairside Assist</td>
<td>3</td>
</tr>
</tbody>
</table>

Additional graduation requirements

Fourth Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENT 54 Appl Dental Sciences</td>
<td>2</td>
</tr>
<tr>
<td>DENT 67 Advanced Dental Procedures</td>
<td>4</td>
</tr>
<tr>
<td>DENT 70 Clinical Chairside Assist</td>
<td>7</td>
</tr>
<tr>
<td>DENT 110A Coronal Polish</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Additional graduation requirements

Certificate Curriculum

The program of study for the Certificate of Completion in Dental Assisting is designed to prepare students to take the licensing examination to be a Registered Dental Assistant as administered by the California State Board of Dental Examiners and also to take the national certification examination to be a Certified Dental Assistant as administered by the Dental Assisting National Board. This course can be completed in two semesters (after completing prerequisites).

Accreditation. The curriculum is accredited by the Commission on Accreditation of the American Dental Association and is approved by the Board of Dental Examiners, Department of Consumer Affairs, State of California.

Information Regarding Admission. Requests concerning admission should be addressed as follows: Department Head, Dental Assisting, Box L-240, City College of San Francisco, 50 Phelan Avenue, San Francisco, California 94112.

Consideration for Admission to the Curriculum. The curriculum in Dental Assisting is open to all interested students who fulfill the following requirements:

1. Be in good physical and mental health.

2. Eligibility for admission to CCSF. (See in this catalog the Admission to College - Admission Open to High School Graduates and Others).

3. File with the Office of Admissions and Records a completed application for admission to City College (for dates, see in this catalog the "Calendar of Instruction"). Students must also complete the Program’s application and health history forms and submit to the Dental Assisting Program’s office.

4. For the one year program, the student must have completed ENGL 90 or ESL 72 or equivalent or higher and ANAT 14 or BIO 9 or PHY 12 or equivalent. In addition, students must satisfy the keyboard requirement of 45 wpm. This requirement may be met by successfully completing a computer or typing class, or a typing test can be administrated at the Program’s office. The course for the typing skill does not need to be met at college level. Proof of successful completion of a computer or typing class will be acceptable on any level.
Advanced Placement. Applicants who have been admitted to the curriculum and who have previous education or experience in dental assisting may apply for credit and advanced placement in the curriculum. However, such applicants should first have completed the science, English and keyboard requirements.

Basis for Disqualification. Students who receive a final grade lower than C in any dental assisting course will be disqualified from continuing in the curriculum. Students who receive a final grade lower than C will be permitted to repeat a course only once and must achieve a grade of C at all evaluation periods. Students who repeat a course and who do not achieve a grade of C at an evaluation period will be disqualified from continuing in the curriculum. Students may also be disqualified for other reasons consistent with College policy.

Eligibility for the Certification Examination and Licensure Examinations. Graduates who receive an Award of Achievement or a Certificate of Completion are eligible to take the Certification Examination given by the Dental Assisting National Board and the Licensure Examinations to become a Registered Dental Assistant given by the Board of Dental Examiners.

Requirements for the Certificate of Completion. Students may obtain the Certificate of Completion in Dental Assisting by completing the following courses with an average final grade of C (2.00 grade-point average) or higher:

First Semester
Course Units
DENT 51 Appl Dental Sciences I 4
DENT 52 Intro to Dental Procedures 3
DENT 53 Intro to Chairside Assisting 3
DENT 55A Dent Roentgenography 2
DENT 62 The Dental Assistant in Practice 3

Second Semester
DENT 54 Appl Dental Sciences II 2
DENT 55B Dent Roentgenography 2
DENT 57 Dent-Office Management 3
DENT 67 Adv Dental Procedures 4
DENT 70 Clinical Chairside Assist 7
DENT 110A Coronal Polish 0.5

Credit Toward Graduation. All credit that students earn in obtaining the Certificate of Completion in Dental Assisting may also be applied toward satisfaction of the requirements for graduation from the College.
DENT 55A. Dental Roentgenography (2)
Lec-1, lab-3
Coreq.: DENT 51 and 62 (or completed)
Instruction in the basic principles of radiography, history, protection and safety guidelines. Physics and biological effects of radiation, for the patient's operator's protection and comfort. Types of films, exposure and manual processing techniques on manikins. Composition and preparation of solutions. The relationship of dental anatomy and facial structures to the exposure and mounting films. CSU

DENT 55B. Dental Roentgenography (2)
Lec-1, lab-3, field trips
Prereq.: DENT 55A
Instruction in the advanced techniques of dental radiography, anatomical landmarks, dental anatomy pertaining to dental radiography, exposure and processing faults. Emphasis is on evaluation of the quality of the films both intra and extra oral. Experiences in exposing full mouth radiographs for diagnosis by dentists. Processing and maintaining automatic processors. Knowledge of panoramic techniques and other related radiographic equipment. CSU

DENT 57. Dental-Office Management (3)
Lec-3
Prereq.: DENT 51 and 55A
The role of the dental assistant as receptionist, secretary, and office manager; oral and written communication; clinical record keeping; case presentation; fees and collection of accounts; dental insurance forms; maintenance of supplies and inventory; dental laboratory communications; office procedures manual; pegboard and computer bookkeeping systems used in dentistry. CSU

DENT 62. The Dental Assistant in Practice (3) fa
Lec-2, lab-3, field trips
Coreq.: DENT 51 and 55A.
The dental health team, ethics and jurisprudence, history of dentistry, home care instruction; including bleaching, applied psychology, communication skills; verbal and written (telephone/fax/computer) communication, the special patient, appointment control, recall systems and the administrative assistant. CSU

DENT 67. Advanced Dental Procedures (4)
Lec-3, lab-3
Prereq.: ENGL 90; DENT 51, 52, 53 and 55A
Coreq.: DENT 70
Instruction in the specialties of dentistry including advance endodontics, periodontics, orthodontics, oral surgery, removable prosthodontics and pediatric dentistry as well as the armamentarium required in each specialty. Development of preclinical skills in the extended functions which are required of the registered dental assistant. Students are required to meet standards of competency for each required task including coronal polishing and ultrasonic removal of cement from orthodontic bands. Mannequins and patients will be used in instruction. CSU

DENT 70. Clinical Chairside Assisting (7)
Lec-1.5, lab-18
Prereq.: DENT 52 and 53; current healthcare provider CPR, DENT 54, 55B, 57 and 67 (concur.)
Clinical instruction and practice in four-handed procedures. Emphasis on general and specialty dentistry (oral surgery, periodontics, endodontics, orthodontics, prosthodontics) and the intra-oral tasks assigned to the registered dental assistant. Development of professional attitude (ethics/jurisprudence) in dental assisting. Building skills in the use of dental materials and equipment. Evaluation of clinical experience, career placement opportunities, and skills building in communication and the taking of the Registered Dental Assisting Practical Examination. CSU

DENT 110A. Coronal Polish (0.5)
Lec-6, conf-8 (14 total hrs)
Repeat: max. 1.5 units
CR/NCR only
Designed and approved to meet the California Board of Dental Examiners Sticker for Coronal Polish. Includes lecture and clinical hours. Techniques for removal from the clinical crown the following: pellicle, plaque, and extrinsic stain. CSU

Dental-Laboratory Technology
Announcement of Curricula

Certificate Curriculum
The curriculum in Dental-Laboratory Technology, a two-semester course of study, is designed to train students to do the kinds of dental work not performed directly on patients. This includes making full and partial dentures, metal inlays, crowns, bridges, and porcelain fused to metal restorations. Additional semesters may be required to complete the graduation requirements needed to graduate from the College with a degree.

Approval. The curriculum is approved by and offered in cooperation with the California Dental Laboratory Association.

Admission. Students are admitted to the curriculum in August. Enrollment is limited, therefore, to be considered for admission, those desiring to enter the curriculum must submit an application to the Dental Laboratory Technology Office. To receive an application you may call 239-3625, send a written request, or ask for an application at the Dental Laboratory Technology Office, Bungalow 314. Requests should be submitted not later than April 15 for the fall semester. Students who have been accepted into the DLT program are also required to complete the admissions procedure for the College.

Continuing in the Program. Only students who receive a passing grade in Dental-Laboratory Technology 71A, 72B, or 73A may continue into the related second semester courses. Dental Technicians with experience, dental students or foreign dentists with a satisfactory score on the DTL Challenge Examination may be allowed in second semester classes if space permits.

Certificate of Completion and Associate in Science Degree. Students who complete four units of general education and complete the curriculum with an average final grade of C (2.00 grade-point average) or higher will receive the Certificate of Completion.
in Dental-Laboratory Technology. Students who wish to earn an Associate in Science degree must complete the general education requirements for graduation from the College. Students who satisfy these requirements and complete the Curriculum receive the degree of Associate in Science and the Certificate of Completion in Dental Laboratory Technology. Such students should consult with a College counselor.

**Employment.** Graduates who receive the Certificate of Completion have opportunities for employment, in commercial dental laboratories, in dentists' laboratories, and with federal and state agencies. Graduates may also qualify for entry level employment as sales representatives of companies manufacturing or selling dental supplies; or, after obtaining the necessary experience, establish their own laboratory business.

**National Certification.** Graduates may, after four years of employment in a dental laboratory, take the Certified Dental Technician written and practical examinations given by the National Board for Certification, Alexandria, Virginia.

**Purchase of Supplies and Equipment.** At the beginning of the first semester, students are required to purchase instruments and equipment used in all three first semester dental-laboratory courses. The cost of the kit is approximately $200. The kit may be purchased in part of in whole from local dental equipment suppliers within the first week of the semester. The three required textbooks cost about $140.

**Courses Required for the Certificate of Completion in Dental-Laboratory Technology**

**First Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLT 71A Complete Dentures</td>
<td>4</td>
</tr>
<tr>
<td>DLT 72B Fixed Prosthodontics</td>
<td>4</td>
</tr>
<tr>
<td>DLT 73A Morphology</td>
<td>2</td>
</tr>
<tr>
<td>Additional certificate requirements</td>
<td>2</td>
</tr>
</tbody>
</table>

**Second Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLT 72A Partial Dentures</td>
<td>4</td>
</tr>
<tr>
<td>DLT 73B Adv Morphology</td>
<td>2</td>
</tr>
<tr>
<td>DLT 76 Dental Ceramics</td>
<td>4</td>
</tr>
<tr>
<td>Additional certificate requirements</td>
<td>2</td>
</tr>
</tbody>
</table>

**Diagnostic Medical Imaging**

(Formerly Diagnostic Radiologic Technology)

**Announcement of Curricula**

**Degree Curriculum**

The curriculum in Diagnostic Medical Imaging is approved by the Joint Review Committee on Education in Radiologic Technology, located at 20 N. Wacker Drive, Suite 900, Chicago, IL 60606-2901, Tel: (312) 704-5300, and by the California Department of Health, and is offered in affiliation with several San Francisco hospital radiology departments.

**Consideration for Admission to the Curriculum.** To be considered for admission to the curriculum, applicants must—

1. Have completed with final grades of C or higher: MATH 840 (Elementary Algebra) and CHEM 30/31 or 40. Documented algebra classes completed at secondary school levels, may be credited by demonstration of a score on the CCSF Algebra placement test indicating eligibility for MATH 90 or 860.
2. Have at least a 2.0 cumulative grade point average in college work previously completed.
3. Be in good physical and mental health
4. File with the Office of Admissions and Records a completed application for admission to City College (for dates, see in this catalog the “Calendar of Instruction”)
5. Take the City College of San Francisco placement tests on the date or dates stated in the notice mailed by the College. All applicants must take the City College placement tests (mathematics, English)
6. Submit an application to the Radiologic Technology Office. Contact Radiology Department for filing deadline dates. (Applications are available in the Radiologic Technology Department Office, Room 134, Science Hall.)

Applicants who satisfy the preceding requirements will qualify to participate in an orientation session conducted by the faculty of the Diagnostic Medical Imaging Program to review the requirements and expectations of the program.

Coeducational Enrollment. Enrollment is open to both men and women.

Health Clearance Requirements. In addition to academic requirements and orientation, enrollment in the Diagnostic Medical Imaging Program is subject to evidence of immunizations per the San Francisco Health Department. The forms are available from the Radiologic Technology office.

Instruction in the Major. The course of study includes instruction in radiologic theory and techniques, pathology, patient care, radiation protection, anatomy, physics and physiology. The curriculum is 30 months in length, including two academic years, with a summer session between the first and second semesters, and ending with a clinical internship of 32 weeks. Clinical education in diagnostic medical imaging is taught in the radiology departments of the hospitals affiliated with the College in offering the program. Members of the professional and technical staffs of these departments serve as instructors.

Upon satisfactory completion of the clinical internship in an affiliate hospital, the student is awarded the Associate in Science degree.

Scholarship Requirements. Students who receive a final grade lower than C (75%) in any of the required courses in radiologic technology, are required to repeat the course before proceeding to the next course in sequence. Students whose cumulative grade point average drops below 2.0, will not be allowed to proceed to the next course(s) until the GPA has been raised to 2.0 or higher.

Basis for Disqualification. Students who receive a final grade lower than C (75%) will be allowed to repeat that Diagnostic Medical Imaging (DMI) course. Any further courses with grades lower than C (75%) will be cause for dismissal from the Diagnostic Medical Imaging Program. Students may be suspended or dismissed for excessive absences either on campus or at the clinical affiliate, according to the attendance policy, or for other reasons consistent with College policy, as set forth in the Catalogue under General Information.

Readmission of Students Disqualified Because of Unsatisfactory Scholarship. Students who have been disqualified from continuing in the curriculum because they received a final grade lower than C and who desire to be re-admitted must submit a new application to the Radiology Department Review Committee. As part of the procedure, the Committee will meet with the applicant prior to making a decision. The Committee will base its recommendations on the current policy of the Diagnostic Medical Imaging Program, which is available from the Department office.

Associate in Science Degree and Award of Achievement. The course of study is designed so that students may satisfy the requirements for graduation from the College. Students who satisfy these requirements, complete the required courses in the curriculum, including the 32-week clinical internship, with final grades of C or higher, will receive the Award of Achievement in Diagnostic Medical Imaging.

State and National Certification. Graduates of the Option in Diagnostic Medical Imaging are eligible to take the certification examination administered by the California Department of Health. State certification is required for employment in California. Graduates are eligible for and are encouraged to take the certification examination given by the American Registry of Radiologic Technologists, a national certification board recognized by the Joint Review Committee for Education in Radiologic Technology. Many employers require national certification.

Purchase of Uniforms. Students are required to purchase the uniforms required in the courses in radiologic technology. The cost of uniforms is approximately $75.

Sequence of Courses. The following sequence of courses is for students starting in the fall. Sequence changes for students starting in the spring. Contact the Radiologic Technology office for further information.

Courses Required for the Award of Achievement in Diagnostic Medical Imaging

First Semester
Course.................................................. Units
ANAT 25 Gen Human Anatomy.......................... 4
PHYC 10 Conceptual Physc.............................. 3
PHYC 10L Conceptual Physc Lab........................ 1
DMI 49 Intro to Radiologic Technology............... 3
DMI 50A Intro to Med Radiography.................... 3
RADL 52 Patient Care and Staff Relationships........ 2
Additional graduation requirements

Second Semester
Course.................................................. Units
DMI 50B Radiologic Physc and Equip.................. 2
DMI 51A Radiographic Anat and Position............... 4
DMI 51B Radiographic Exposure Factors............... 2
HLTH 14* CPR Adv First Aid Emerg Care.............. 2
PSYC 1 or 26 Gen Psych or Human Relat.............. 3
Additional graduation requirements
* This course is strongly recommended, but may be replaced by a current Adult/Pediatrics Red Cross CPR card. Evidence must be furnished to the Radiology Department office prior to the start of DMI 62.

Summer Session
Course.................................................. Units
DMI 62 (seven weeks) Clinical Educ in DMI........ 2
Third Semester
SPCH 11, 12 or 1A Intro to Publ Speak or Fundamentals of Oral Commun 3
or Elements of Publ Speak
PHYS 12 Intro to Human Physio 4
DMI 55 Skull Radiography and Resrch Project 2
DMI 56 Pathology 2
DMI 63 Inter Imaging Proc 2
DMI 64 Clin Educ in DMI 2
Additional graduation requirements

Fourth Semester
ANAT 26 Cross Sectional Anat 1
DMI 54 Vascular and Interven Proc 2
DMI 65 Adv Imaging Proc 2
DMI 66 Clinical Educ in DMI 2
RADL 70 Radiation Protection 2
Additional graduation requirements

Internship
DMI 68 Clinical Educ in DMI 4
DMI 69 Clinical Educ in DMI 4
DMI 100 Review of DMI 1

Recommended electives: PHOT 51 and courses in keyboarding, computer science, and psychology

Diagnostic Medical Imaging
Announcement of Courses

CREDIT, DEGREE APPLICABLE COURSES:

DMI 49. Introduction to Radiologic Technology (3)
Lec-3, field trips
Open to all interested students
History and discovery of uses of medical radiation; careers in radiology and educational preparation; function of health care units utilizing radiologic technology; associated imaging modalities of radiologic technology; medical ethics for radiologic technologists; sources of radiation; principles of radiation protection; medical terminology; career advancement and mobility; and use of a major medical library. CSU

DMI 50A. Introduction to Medical Radiography (3)
Lec-2, lab-3, field trips
Prereq.: Admission to the curriculum in DMI; DMI 49 (concur.)
Introduction to radiological physics, film exposure and film processing. CSU

DMI 50B. Radiologic Physics and Equipment (2)
Lec-2, lab-2, field trips
Prereq.: PHYC 10 and 10L and DMI 50A (concur.)
Physics as applied to radiography, fluoroscopy, and radiotherapy. X-ray circuits. The interaction of ionizing radiations with matter. Basic radiation protection. Equipment used in radiology and oncology. CSU

DMI 51A. Radiographic Anatomy and Positioning (4)
Lec-4, lab-3, field trips
Prereq.: ANAT 25, DMI 49 & 50A; RADL 52 and DMI 50B and 51B (concur.)
Preliminary steps in radiography. Anatomy and positioning of extremities, thorax, vertebral column, pelvic and shoulder girdles, thoracic viscera, abdomen, gastrointestinal, biliary, and genitourinary tracts. CSU

DMI 51B. Radiographic Exposure Factors (2)
Lec-2, lab-1
Prereq.: Completion of first semester Diagnostic Medical Imaging courses
Coreq.: DMI 51A.
Practical and theoretical application of exposure factors. Emphasis is placed on the students' ability to analyze the quality of the recorded image and to improve the image. Film critique of experiments and of the department's film file. CSU

DMI 54. Vascular and Interventional Procedures (2)
Lec-2, field trips
Prereq.: DMI 62, 63; DMI 64 or 66 (concur.)
Emphasis on vascular radiography, neuroradiography, digital subtraction angiography, and other special radiological procedures. CSU

DMI 55. Skull Radiography and Research Project (2)
Lec-2, field trips
Coreq.: DMI 62, 64, or 66
Anatomy and radiography of the head. Student research projects. CSU

DMI 56. Pathology (2)
Lec-2, field trips
Coreq.: DMI 62, 64, 66, or RADL 83
Discussion and illustration of the normal variations and abnormal changes because of disease as manifested by X-rays. Description of the modifications of standard and special techniques necessary to obtain adequate diagnostic X-ray studies of the various diseases. CSU

DMI 62. Clinical Education in Diagnostic Medical Imaging (2) sp and su
Conf-16 sp (7 wks at 40 hrs su)
Prereq.: ANAT 25; DMI 49, 50A, 50B, 51A, 51B, and RADL 52
Practical experience in the radiology department of a hospital. Students must perform all radiographic goals as stated in the course objectives. CSU

DMI 63. Intermediate Imaging Procedures (2)
Lec-2, lab-1
Coreq.: DMI 62, 64, or 66
Basic theories of intermediate diagnostic radiologic procedures. Relationship of clinical indications, special considerations, equipment, and patient positioning. Introduction to the use of computers in radiology. CSU
DMI 64. Clinical Education in Diagnostic Medical Imaging (2) fa and su
Conf-16 fa (7 wks at 40 hrs su)
Prereq.: DMI 62
A continuation of the clinical experience. Student must perform all radiographic goals as stated in the course objectives. CSU

DMI 65. Advanced Imaging Procedures (2)
Lec-2
Coreq.: Clinical assignment
Principles of CT and MRI, radiography of infants and children (immobilization techniques and alleviation of fear); radiography of the female reproductive system; dynamic imaging. CSU

DMI 66. Clinical Education in Diagnostic Medical Imaging (2)
Conf-16
Prereq.: DMI 64
A continuation of the clinical experience. At the completion of the course, the student must have completed a minimum of 840 clock hours of clinical experience and be able to perform all radiographic goals as stated in the course objectives. CSU

DMI 68. Clinical Education in Diagnostic Medical Imaging (4)
Conf-40
Prereq.: DMI 66
Clinical performance of internship objectives. Bi-weekly on-site conferences on a rotating basis by the faculty. CSU

DMI 69. Clinical Education in Diagnostic Medical Imaging (4) su
Conf-40
Prereq.: DMI 66
(Student commencing internships in the summer will take DMI 69 before 68.)
Clinical performance of internship objectives. Bi-weekly on-site conferences by the faculty. CSU

DMI 100. Review of Diagnostic Medical Imaging (1)
Lec-3.5 (5 wks)
Prereq.: DMI 68, 69
Designed to prepare students for the certification examination given by the American Registry of Radiologic Technologists and for the examination for certification given by the California Radiologic Health Branch. Career planning resources. CSU

DMI 120. Ultrasound Physics and Instrumentation (2)
Lec-2, field trips
Prereq.: Be a graduate and hold certification from an accredited allied health program with a direct patient-care component; e.g., nursing, radiography, radiation therapy, nuclear medicine, or respiratory care. Introduction to the physical principles of ultrasound. Analysis of the routine parameters of a diagnostic ultrasound beam; utilization of ultrasound scanners for the production of ultrasound waves used to interact with tissue; biological safety and risks. CSU

DMI 122. Sectional Anatomy for Sonographers (2)
Lec-2, lab-1, field trips
Prereq.: Have completed an allied health program with a direct patient-care component; e.g., nursing, radiography, radiation therapy, nuclear medicine, or respiratory care. Introduction to the related anatomy and physiology of the abdomen and pelvis as it appears in sagittal, coronal, and transverse sections on ultrasound scans. Emphasis on normal anatomy as visualized on sonograms. CSU

DMI 123. Obsyn Sonography (2)
Lec-2
Prereq.: Have completed an allied health program with a direct patient-care component; e.g., nursing, radiography, radiation therapy, nuclear medicine, or respiratory care. Identification of sectional anatomy used in OB/GYN scanning, both normal and abnormal, as it appears in sagittal, coronal, and axial scans. Field trips as required. CSU

DMI 125. Ultrasound Clinical Education (6)
Lab-35
Prereq.: Have completed an allied health program with a direct patient-care component
Coreq.: enrollment in Ultrasound lecture course.
Course is designed to give the student appropriate time in the clinical setting to become adept at scanning, while understanding the principles of quality assurance, patient care and the integration of clinical findings with patient history. CSU

Disabled Students Courses
Announcement of Courses

All courses that begin with DPS are designed for, but not limited to, individuals with disabilities.

CREDIT, NON-DEGREE APPLICABLE COURSES:

DPS A. Computer Adaptations (1)
Lec-3
The content of DPS A varies. A student with a disability may repeat DPS A if it is needed for the continued success of the student in his/her CCFS classes, and the student has demonstrated progress using the supports learned in DPS A.

DPS M. Diagnostic Learning (2)
Lec-1, lab-3
Prereq.: GUID I or equivalent Title 5 state-mandated assessment, and documentation of a learning disability; enrollment in at least one other class at City College of San Francisco
Repeat: as needed for the continued success of the student in his/her CCFS classes and if the student has demonstrated progress using the support learned in DPS M.
Not open to students who have completed LERN M.
An individualized course designed for students who have a documented disability, similar in content to DPS O except that DPS M is designed for those students who have support and intervention needs which require more intensive daily assistance in one or more major skill areas or courses in a particular semester.
DPS O. Diagnostic Learning (1)
Lab-3
Repeat: if needed for the continued success of the student in his/her CCSF classes and the student has demonstrated progress using the supports learned in DPS O.
Students who have completed LERN O may not enroll in DPS O.
An individualized course designed for students who have a documented disability, similar in content to DPS M except that DPS O is designed for those students who have support and intervention needs which only require assistance for one or two CCSF classes in a particular semester.

DPS P. Perspectives on Disability Rights (1)
Lec-2 (9 wks)
CR/NCR only
Students who have completed LERN P may not enroll in DPS P.
Disability, education, and employment rights; development of understanding of rights and obligations to accommodations as provided under The Americans with Disabilities Act (ADA) and Section 504 of the Vocational Rehabilitation Act of 1973; development of self-management and self-advocacy skills for students with disabilities as related to their accommodation rights; recent legislation related to disability rights.

DPS Q. Main Idea Strategies for Reading and Writing (1)
Lec-2 (9 wks)
CR/NCR only
Designed specifically for students with learning disabilities who are in English I, 90, 92, 94, 96, or any student in content courses involving reading and writing who wants to improve his or her reading comprehension skills and basic written expression skills. Examination of the prerequisite language and reasoning skills necessary for identifying the main idea in addition to textbook reading study skills.

DPS R. Improving Receptive & Expressive Language (3)
Lec-3, conf-1
CR/NCR only
Not recommended for students enrolled in or who would be eligible for beginning level ESL 22 through 68.
For students with disabilities having problems in studying for academic classes, listening to lectures, taking notes, and getting satisfactory grades on tests. Extensive skill-building in listening, concentration, and organizing information. Emphasis on improving verbal communication.

DPS S. Strategies for Problem Solving
Lec-2 (9 wks)
CR/NCR only
This overview course is designed for students with learning disabilities but is open to all students. Practice and practical application in a variety of creative and critical thinking problem-solving process strategies presented for all learning modalities.

NONCREDIT
DPS 4009. Vocational Skills for the Disabled
Development of necessary skills to obtain entry-level employment. Through participation in actual work situations, students learn basic work skills, work behaviors and interpersonal skills necessary for obtaining and holding a job. Emphasis is on developing each student's maximum potential for work.

DPS 4013. Fabric Arts

DPS 4014. Arts and Crafts for the Disabled
Arts and crafts for all disabilities. Introduces basic art concepts and crafts skills. Students create projects using materials and processes increasingly more challenging as the course progresses and their abilities permit. Adaptive equipment and techniques introduced as needed.

DPS 4017. Drama for the Disabled
Developmentally and physically disabled students learn to explore and develop abilities in creative self-expression. Through participation in a variety of dramatic experiences, students develop their communication skills, increase coordination and sensor-motor communication skills and learn to function as group members. Process may lead to dramatic productions.

DPS 4022. Computer Skills
Advis: ABE 2013 and 2029
Introduction to microcomputer applications for disabled students who desire entry-level clerical work. Introduces word processing, spreadsheet and database concepts using popular business software through lecture, lab and individualized instruction. Students create, edit, manipulate and print their own documents. May include the use of adaptive equipment such as screen enlargement or voice output.

DPS 4023. Job Search Skills, Disabled Lab
Students with disabilities who are unable to benefit from a regular vocational program meet in small group workshops for one to ten hours per week. Hours and times are based on Student Educational Contact (SEC). Appropriate assistance is given in developing attitudes, self-confidence, and vocational competencies to locate, secure and retain employment. Field experiences with local employers, job training groups, and local organizations may be required.

DPS 4024. Prevocational Skills
Extended individual social, basic survival, and independent living and work skills for students with developmental disabilities who need these skills to enter a work training program or sheltered employment.

DPS 4026. Acquired Brain Impairment - Personal and Social Adjustment
Students with acquired brain impairments, such as stroke and head trauma, explore problems in social, vocational and educational settings and are helped to recognize how their disabilities interfere with effective social interactions. They examine their values and develop realistic life goals. Exercises are provided to help students identify and apply effective interpersonal communication skills.
DSPS 4027. Acquired Brain Impairment - Academic Retraining
Academic instruction provided for students with acquired brain impairments, such as stroke and head trauma. Helps students achieve their maximum performance in order to succeed on the job and/or in educational settings. Retraining provided for individuals and groups in reading, writing, spelling, mathematics and study skills, according to each Student Educational Contract (SEC).

DSPS 4028. Acquired Brain Impairment - Cognitive Retraining
Students with an acquired brain impairment, such as stroke and head trauma, learn about basic neuroanatomy and how different injuries can affect how the brain functions. Introduction to memory strategies, techniques in visualization, time management and organizational skills. Students participate in activities involving following directions, problem-solving, memory, long-term planning and reasoning skills in accordance with Student Educational Contract (SEC). Personal, social, vocational and educational changes and adjustments are addressed.

DSPS 4029. Educational Assessment - Disabled
Individual and/or small group assessment of learning strengths and weaknesses to determine eligibility to programs and/or accommodations for disabled adults. May include eligibility for services as a learning disabled adult and/or the development of a Student Educational Contract (SEC). Students will attend 1-5 sessions. Times to be arranged by the instructor.

DSPS 4031. Program for Learning Disabled
Academic instruction is provided for students with learning and other cognitive disabilities. Designed to help students achieve their maximum performance in order to succeed on the job and in educational settings. Small group instruction is provided in math, reading, writing, and spelling according to each student's educational contract (SEC).

DSPS 4032. Office Skills for Disabled
Adviser: HSEN 2287
Basic office skills for disabled students who desire entry-level clerical work. Covers standard business forms and formats in electronic document processing, recordkeeping, and filing. Practice in proofreading for correct English grammar, punctuation and spelling, and work on improving keyboarding speed through computer tutorials.

DSPS 4033. Acquired Brain Impairment - Language Reintegration
For students experiencing receptive and/or expressive language disorders (aphasia) resulting from stroke or other acquired brain impairments. Emphasis on auditory comprehension, thought organization, oral expression and writing. Individualized and group instruction is provided according to each Student Educational Contract (SEC).

DSPS 4034. Effective Communication for Disabled
For students with disabilities needing to increase their knowledge of the communication process. Emphasis on developing and improving verbal skills necessary for educational, vocational and social settings. Topics include listening, speaking, pragmatics and communication breakdowns. Instruction provided in small groups. Students practice skills through role playing activities and classroom speeches.

DSPS 4035. High Tech Computer Access for the Disabled
A laboratory course for the disabled introducing adaptive computer equipment and software for development of vocational, academic and daily living skills. Computer assisted instruction in cognitive and academic skills. Word processing, spreadsheet, database, graphics, Internet, and e-mail in accessible formats.

DSPS 4036. Business English
Adviser: ABE 2013
Review of basic English grammar, punctuation, spelling and writing designed for disabled students who want to perform competitive entry-level clerical work.

DSPS 4037. Speech And Language Skills
Strategies to alleviate communication deficits are provided for students with diagnosed speech, language and/or hearing disorders. Individual and small group instruction. Intake assessment is provided.

DSPS 4038. Community Living Skills
Using lecture, demonstration, roleplaying discussion exercise, field experience and the expressive arts, students with disabilities will develop and utilize skills needed for successful participation in the community.

DSPS 4041. Individualized Basic Education
This course is designed for students with disabilities who need individualized diagnostic/prescriptive instruction in reading, writing and mathematics.

DSPS 4042. Active Job Search
10 hr/wk
Designed for all students with disabilities who are job ready and need placement services and advanced job search strategies. Tailoring resumes, cover letters, and applications. Interviewing techniques and job search planning/management. Field experiences to local businesses, employers, and organizations may also be required.

DSPS 4043. Orient To Vocational Ed
Designed for students whose psychological disabilities interfere with the achievement of their educational and vocational goals. Course content will be tailored to the special needs of the students. Development of appropriate classroom behaviors, study skills and self confidence will be stressed. The emphasis will be on the acquisition of vocational skills.
DPS 4050. Life Skills for the Disabled
Designed for students identified as developmentally delayed learners who want to improve their basic life skills for vocational purposes and are unable to benefit from instruction offered in regular classes. Small group instruction is offered in money handling skills, computer basics, city development and resources, and personal responsibility in preparation for entry level jobs and daily living. Students with reading levels below third grade may experience difficulty. The course is designed to be completed in two years as long as the student is making measurable progress.

DPS 4302. High School, GED, and Basic Skills for Disabled Students
Prereq.: Contact DSPS Office for HS diploma and GED eligibility requirements
Repeat: if making measurable progress and/or until requirements met
Designed for students with disabilities who want to earn a high school diploma or GED or who want to improve their basic skills for vocational or higher education purposes and are unable to benefit from instruction in regular classes. Small group and individualized instruction in reading, writing, mathematics, and other high school subject areas and in preparation for proficiency and/or GED tests, as specified on each student's Student Educational Contract (SEC).

DPS 4303. Adaptive Physical Education (Adaptive Yoga)
Designed for students with physically disabling conditions who want to improve and maintain their physical and mental well-being and who are unable to benefit from instruction offered in mainstream P.E. classes.

Blind/Visually Impaired
DPS 4101. Communication - Blind/Visually Impaired
Through adapted exercises in writing, spelling, handwriting, vocabulary building, speaking and listening, students improve skills to compensate, in part, for visual loss.

DPS 4104. Crafts - Blind/Visually Impaired
Various crafts and ceramics for students who are blind or visually impaired. Emphasis on skills which enhance daily life. Crafts include knitting, crocheting, sewing, macrame, beadwork, weaving, painting, printmaking and ceramics.

Deaf/Hard of Hearing
DPS 4210. Management of Hearing Loss
Instruction and practice in speechreading and other adaptive behavioral strategies. Acquaints students with appropriate assisting devices and available services for the hearing impaired. Accepting and coping with hearing loss is a fundamental objective. Appropriate for hearing impaired individuals and interested professionals.

DPS 4212. ASL/ESL Skills Development for the Deaf
This course is intended for deaf and hard of hearing students who desire to improve their English writing skills. The course provides exposure to written English and American Sign Language, focusing on the functional needs of the students.

DPS 4214. American Sign Language I
A beginning course in American Sign Language for persons desiring to communicate with deaf and hard of hearing persons. Coursework includes an introduction to Deaf Culture, expressive and receptive finger spelling and grammatical structures which are introduced in the contexts of communication activities.

DPS 4215. American Sign Language II
An intermediate course in sign language for the hearing impaired or persons desiring to communicate with the deaf or hard of hearing. Continuation of the students' work in manual communication skills, with emphasis on daily communication problems and colloquial expressions.

Earth Sciences
Announcement of Courses

CREDIT, DEGREE APPLICABLE COURSES:

Geography
GEOG 1. Physical Geography (3)
Lec-3, field trips
An introduction to the Earth's physical environment. Processes and patterns of weather and climate, the development of landscapes, plant and animal distributions, and the interpretation of maps. Attention given to the physical environment and natural hazards of California and the Bay Area. CSU/UC/CAN: GEOG 2

GEOG 1L. Physical Geography Laboratory (1)
Lab-3, field trips
Prereq.: GEOG 1 (concur.)
The study of weather and climate, tectonic processes, and landforms. Emphasis on the interpretation of weather maps, climatic data, aerial photographs, and topographic maps. CSU/UC

GEOG 4. Cultural Geography (3)
Lec-3, field trips
An introduction to patterns in the contemporary human landscape. Topics include dynamics of population growth, migration, systems of agriculture, the legacy of colonialism, uneven economic development, the historical development and spread of religion and language. CSU/UC/CAN: GEOG 4

GEOG 7. Economic Geography (3)
Lec-3, field trips
An introduction to economic geography. Topics include patterns and processes of urbanization, industrialization, and the inter-linked global economy. Contemporary issues such as international business and changing patterns of manufacturing in the United States. CSU/UC

GEOG 49. National Parks—Their Geology and Geography (3)
Lec-3, field trips
A survey of the national parks and national monuments with emphasis on the western United States. An introduction to their discovery and development; appreciation of their particular beauties, natural phenomena, and historic significance. CSU
GEOG 91-92-93. Geography Work Experience (1-2-3)
Work-5, 10, 15
CR/NCR avail.
Repeat: max. 6 units
Off-campus work may include employment or volunteer service in a geography-related setting (e.g., laboratory, museum, park) under the supervision of a qualified professional or faculty member. On-campus work consists of instruction and experience in the preparation, care, and maintenance of equipment, training aids, and specimens used in the Earth Sciences Department. CSU

GEOG 186. Introduction to Geographical Information Systems (GIS) Applications (2)
Lec-1, lab-3
Foundation course for the use of GIS software. History, structure, uses, hardware and software requirements, and basic operation of GIS. Introduces Global Positioning Systems (GPS) as they relate to GIS. CSU
GEOG 186 = ET 186

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Geology

GEOL 5. General Geology (4) sp
Lec-3, lab-3, field trips
Not open to students who have completed GEOL 10
An introduction to the materials and processes which form our planet. A look at the Earth with an eye toward understanding its physical aspects. Rocks and minerals; continents and ocean basins; construction and destruction of the landscape; mountains, earthquakes, global tectonics. Geological methods, tools, and information sources. CSU/UC

GEOL 10. Introduction to Geology (3)
Lec-3, field trips
Not open to students who have completed a course in general geology, or to students majoring in physical science or civil engineering
An introduction to the basic concepts of earth science and their relationships to people. Topics include minerals, rocks, volcanoes, earthquakes, streams, glaciers, geologic hazards, mineral resources, and plate tectonics. Emphasis on the geologic features of western North America. CSU/UC; GEOL 10+10L: CAN: GEOL 2

GEOL 10L. Introduction to Geology Laboratory (1)
Lab-3, field trips
Prereq.: GEOL 10 (concur.)
Introduction to the materials of the Earth, with emphasis on the recognition of common minerals and rocks, especially those common to California; study and interpretation of topographic and geologic maps. CSU/UC; GEOL 10+10L: CAN: GEOL 2

GEOL 11. Historical Geology (3)
Lec-3, field trips
Prereq.: GEOL 5 or 10
Origin of the Earth and its development through geologic time. The formation and destruction of mountain ranges and ocean basins. The evolution of plants and animals as seen through the fossil record. Emphasis on the geologic history of North America. CSU/UC/CAN: GEOL 4

GEOL 18. Geology of California (3)
Lec-3, field trips
CR/NCR avail.
Not offered in same year as GEOL 21
An introduction to California from a geologic viewpoint. The rocks and minerals, the geologic features, and the economic geology of California. The geologic history and importance of each natural province of California. CSU/UC

GEOL 20. Exploring the West (1)
Field trip-3 days and orientation
CR/NCR avail.
Prereq.: Any City College geology course (concur.)
Repeat: max. 4 units
Field excursion to a selected locality of geologic interest in the West, mainly California. Emphasis on the geologic history of the area as reflected by present geologic features. Localities include: Yosemite National Park; Lassen National Park; Mono Basin; Lake Tahoe and vicinity; northern and southern Mother Lode regions; Central Coast Ranges and San Andreas Fault; Coast Range north and south of San Francisco Bay; and special areas. CSU

GEOL 21. Geology of the Bay Area (3)
Lec-3, field trips
CR/NCR avail.
Not offered in same year as GEOL 18
Introduction to the geology of the Bay Area. Field trips emphasizing the physical, historical, engineering, and economic geology of the region. CSU

GEOL 25A-25B. Geology of Gems (3-3)
Lec-3, field trips
CR/NCR avail.
A many-faceted approach to the study of gemstones. All of the major and many minor gem materials examined from the viewpoints of discovery, geology, mineralogy, and use. CSU

GEOL 41-42-43. Current Topics in Earth Sciences (1-2-3)
Lec-1/2/3, and/or lab-3/6/9, field trips
One and two-unit courses are less than a semester in duration.
Exploration of topics of current interest in earth sciences. CSU/UC

GEOL 91-92-93. Geology Work Experience (1-2-3)
Work-5, 10, 15
CR/NCR avail.
Repeat: max. 6 units
Off-campus work may include employment or volunteer service in a geology-related setting (e.g., laboratory, museum, park) under the supervision of a qualified professional or faculty member. On-campus work consists of instruction and experience in the preparation, care, and maintenance of equipment, training aids, and specimens used in the Earth Sciences Department. CSU

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Oceanography

OCAN 10. Introduction to Oceanography (3)
Lec-2, lab-3, field trips
The ocean environment. Physical, chemical, biological, and geological aspects of the sea, including the origin and extent of the oceans; nature of ocean basins; causes and effects of currents, waves, tides; plant and animal life in the sea; marine ecology and pollution. CSU/UC
Paleontology
PALE 1. Introduction to Paleontology (3)
Lec-2, lab-3
An introductory survey of the record of past life. The evolution of plants and animals and their role in the interpretation of the history of the Earth. CSU/UC

Economics
Announcement of Courses

(See also courses in "Business Administration" and "Business.")

CREDIT, DEGREE APPLICABLE COURSES:

ECON 1. Principles of Economics (3)
Lec-3 CR/NCR avail.
An introduction to the general principles, terminology, and methods of economics, with emphasis on macro-economics. General topics include: economic institutions, national income analysis, employment theory, money and banking, monetary and fiscal policy, and economic growth. CSU/UC/CAN: ECON 2

ECON 3. Principles of Economics (3)
Lec-3 CR/NCR avail.
Prereq.: ECON 1
A continuation of the introduction to the general principles and terminology of economics, with emphasis on micro-economics. General topics include: supply and demand theory, utility, production, costs, revenues, market structures, income distribution, international trade, and comparative economic systems. CSU/UC/CAN: ECON 4

ECON 5. Introductory Statistics (4)
Lec-5 CR/NCR avail.
Prereq.: MATH 860 or 92 or 2nd yr HS algebra or placement in MATH 90
No credit for this course if another statistics has been completed.
Introduction to statistical method, with emphasis on the analysis of statistical data—their gathering, classification, presentation, and interpretation. Empirical and theoretical frequency distributions with emphasis on measures of central tendency and variation, probability, sampling, estimation, hypotheses testing, correlation and regression analysis, and nonparametric statistics. CSU/UC

ECON 10. Economic History of the United States (3)
Lec-3 CR/NCR avail.
May be taken in place of HIST 17A or 17B.
A survey of the economic development of the United States from colonial times to the present, with emphasis on the relationship of economic activities to social and political development. CSU/UC

ECON 25. Women in the Economy (3)
Lec-3 CR/NCR avail.
An introduction to women's roles in the U.S. economy, including varying experiences related to race, ethnicity, and class. Examines women's occupations and earnings; women's household activities and how they affect paid work; women as consumers; public policy regarding women's work and poverty; and current special topics. Applies and contrasts mainstream and political economic theories within a feminist perspective. CSU/UC

ECON 30. Economics of the African American Community (3)
Lec-3
An introduction to the principles of Black political economy. Black Employment, Employment Discrimination, Black Capitalism, The Black Underclass, Homelessness, and Community Economic Development. Examination of the empirical link between race, class and income distribution. CSU/UC

Engineering and Technology
Announcement of Curricula

Engineering and industrial practice in the United States is based to a considerable extent on the team concept. Engineers, scientists, experts in management and production, and others coordinate their work with that of technicians, craftsmen, and workers with varying degrees of skill in order to complete particular projects. To meet the varying needs of students and industry, the Engineering and Technology Department at City College of San Francisco offers an Engineering Program along with a series of Engineering Technology programs to train technicians. The programs are designed so that students may satisfy the requirements for graduation from the College and receive a degree of Associate in Science and an Award of Achievement. In addition, The Engineering Technology programs provide a good foundation for transfer to a bachelor degree program in engineering technology or industrial technology.

Courses in the Engineering Department are identified according to the following headings: Engineering (ENGN), Engineering Technology (ET), and Total Quality Management (TQM).

Engineering Program
General Information
Engineers develop the skill to design functional products and systems based upon a foundation formed from engineering, physical science, and mathematics course work. They pursue rewarding careers in a professional environment with good employment and advancement opportunities.

City College of San Francisco offers courses leading to the Associate of Science Degree and Award of Achievement in Engineering. Graduates generally transfer to four-year institutions as juniors where they can major in computer, electrical, electronics, mechanical, civil, industrial, chemical, manufacturing or other engineering. Others seek employment as an engineering assistant.
The degree program is based upon the recommendation of the Engineering Liaison Committee which represents the University of California, California State Universities, private universities, and community college engineering schools and departments.

**Prerequisites.** Beginning courses in engineering require one-year high school courses in algebra, geometry, advanced algebra, chemistry, physics, and mechanical drawing and a half-year course in trigonometry. The equivalents to these courses may be taken at City College.

**First Semester**

**Course** | **Units**
--- | ---
ENGN 24 Design Graphics | 3
ENGN 48 The Engrg Profession | 1
MATH 110A Calculus I | 4
English Composition* | 3
CHEM 103A General Chemistry | 4
Additional GE Requirements† | 2

**Subsequent Semesters**

Additional Major Requirements‡:
- ENGN 20 & 20L Circuit Analysis & Lab | 4
- ENGN 36 Engrg Mechanics: Statics | 3
- ENGN 38 Intro to Comp for Engrs | 3
- ENGN 45 Materials Sci | 3
- MATH 110B Calc II | 4
- MATH 110C Calc III | 4
- MATH 125 Diff Eq | 3
- PHYC 4A & 4AL Mech and Relativity | 4
- PHYC 4B & 4BL Elect & Magnetism | 4
- PHYC 4C & 4CL Waves, Optics, & Thermo | 4
- Technical Elective** | 5
- Additional GE Requirements† | 12

* It is recommended that you complete ENGL 1A if you plan to transfer to a four-year school.
† Consult the catalog for specific requirements and courses available. It is recommended that you try to satisfy the requirements of the transfer institution as well as those of City College.
‡ If you wish to substitute another class because of specific requirements of the transfer institution you will attend, consult with the Engineering Department Advisor.
** Select from the following Technical Electives: CHEM 103B, ENGN 1A, ENGN 37, MATH 120, PHYC 4D.

NOTE: Four-year universities may have additional course requirements for completion of lower division. Consult the Transfer Center and the Engineering Advisor for additional information.

The College offers two-year curricula in engineering technology in two fields: Electronics Engineering Technology and Mechanical Engineering Technology. The curricula in these fields comprise the Engineering Technology Programs. Students should be aware that any change in major, such as a change from one technical curriculum to another or from one program to another, requires additional time for the completion of their revised educational objectives.

**Prerequisites.** High school prerequisites are one-year courses in algebra, geometry, mechanical drawing, and physics and one semester of trigonometry. A one-year course in high school chemistry is highly recommended for students intending to transfer to a bachelor degree program in Engineering Technology. Students who have not completed the required high school courses may take them at City College of San Francisco.

Students should possess a minimum level of competency in English communication skills. The completion of English as a Second Language 72 or ENGL 90 and 92 is recommended.

**Broad Preparation for Employment.** Because emphasis in the Program is on both fundamental engineering theory and basic industrial practices, graduates may qualify for employment in many fields: drafting, production planning and control, manufacturing, testing, inspection, sales, installation, maintenance, or servicing.

Each curriculum in engineering technology includes courses in subjects common to all branches of engineering. In general, these subjects include the following: graphics, mathematics, orientation to engineering, and physics. Through this related study, students obtain a better understanding of the work in their majors and develop a broad technical background.

**General Education.** The curriculum also include instruction in general education so that students may satisfy the College graduation requirements in this area.

**Associate in Science Degree and Award of Achievement.** The Engineering Technology Program is designed so that students may satisfy the requirements for graduation from the College. Students who satisfy these requirements and complete any of the curricula with final grades of C or higher in their major technical courses also receive the Award of Achievement. The Award of Achievement may be considered a recommendation by the faculty of the Engineering and Technology Department, which, in conjunction with the Career Development and Placement Center, will aid the graduate in finding a position.

**Transfer to Other Colleges and Universities.** Students in the Engineering Technology Programs may either enter industry upon graduation or transfer to a four-year institution to earn a bachelor's degree in engineering technology. Several campuses of the California State University such as the Sacramento, Long Beach, and Pomona campuses, as well as private institutions, such as Cogswell College, offer graduates this opportunity. Engineering Technology students may also choose to transfer to a bachelor degree program in industrial technology offered at several campuses of the California State University, such as the San Francisco, San Jose, and Chico campuses. The time required for completion of curricula open
to graduates at these schools is normally two additional years. Students who intend to transfer should consult their advisers and the section in this catalog entitled “Transfer Information.”

**Common Core.** All Electronic and Mechanical Engineering Technology students initially enroll in the following common core courses:

**First Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGN 48 The Engrg Profession</td>
<td>1</td>
</tr>
<tr>
<td>ET 50 Technical Math or equivalent math</td>
<td>4</td>
</tr>
<tr>
<td>ET 104 Intro. to Engineering Drawing &amp; Manuf.</td>
<td>3</td>
</tr>
<tr>
<td>ET 60 Electronics I-DC/AC Circuit Analysis</td>
<td>4</td>
</tr>
<tr>
<td>PHYC 2A/2AL Intro Physics</td>
<td>4</td>
</tr>
</tbody>
</table>

**Second Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET 54 Microcomp Setup, Maint &amp; Repair</td>
<td>2</td>
</tr>
<tr>
<td>ET 63 Intro to Digital Circuits &amp; Techniques</td>
<td>3</td>
</tr>
<tr>
<td>Technical Electives</td>
<td>4</td>
</tr>
<tr>
<td>PHYC 2B/2BL Intro Physics</td>
<td>4</td>
</tr>
<tr>
<td>BSEN 74 Bus Corresp.</td>
<td>3</td>
</tr>
<tr>
<td>or ENGL 94 Inter Reading &amp; Comp</td>
<td></td>
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</tbody>
</table>

**Third Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET 51 Adv Technical Math or equivalent math</td>
<td>4</td>
</tr>
<tr>
<td>Technical Electives</td>
<td>10</td>
</tr>
<tr>
<td>Additional requirement (General Ed)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Fourth Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>TQM 101 Total Qual Management: Princ &amp; Elem</td>
<td>3</td>
</tr>
<tr>
<td>Technical Electives</td>
<td>6</td>
</tr>
<tr>
<td>SPCH 12 Speech</td>
<td>3</td>
</tr>
<tr>
<td>Additional Requirement (General Ed)</td>
<td>3</td>
</tr>
</tbody>
</table>

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**Electronic Engineering Technology**

**Degree Curriculum**

In the curriculum in Electronic Engineering Technology, a two-year course of study, the Engineering and Technology Department offers students training for employment by offering instruction in digital/microprocessor and communication electronics. Students in this curriculum complete the common core courses (see preceding Common Core). Specialization is offered throughout the second through the fourth semesters. The program adviser works closely with each student to assure normal progress. Upon successful completion of the curriculum, students receive the Associate in Science degree and the Award of Achievement.

**Training in the Major.** Training in the first year is designed to provide students with a sound working knowledge of the theory of direct- and alternating-current circuits common to both electrical and electronic applications and the basic principles of amplifiers, solid-state devices, digital techniques, circuits, and systems. In the second year, the student completes a course in advanced electronics, including coursework in RF (radio frequency) and microwave circuits, microprocessors and non-sinusoidal circuits.

**Employment.** Students who complete the curriculum satisfactorily are qualified for positions as technicians engaged in research and development; and in manufacturing, testing, installing, and maintaining electronic equipment. Positions to which graduates may advance after gaining experience are as field engineer, assistant operating engineer, field electrical engineer, and test engineer.

**Award of Achievement.** Students who complete the curriculum with final grades of C or higher in their major technical courses receive the Award of Achievement in Electronics Engineering Technology.

**Technical Elective Courses for the Award of Achievement in Electronic Engineering Technology**

Students majoring in Electronic Engineering Technology must take a total of 20 technical elective units, 17 from the following list and 3 from any technical area. These electronic courses are generally scheduled in the evenings.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET 54 Microcomputer Setup, Maint &amp; Repair</td>
<td>2-6</td>
</tr>
<tr>
<td>ET 65 Electronics II-Linear Active Circuits</td>
<td>4</td>
</tr>
<tr>
<td>ET 163 Nonsinusoidal Circuits</td>
<td>3</td>
</tr>
<tr>
<td>ET 164 Analog and Comm. Electronics</td>
<td>4</td>
</tr>
<tr>
<td>ET 165 PCM/FM Communication Systems</td>
<td>3</td>
</tr>
<tr>
<td>ET 151 Assembly Lang &amp; Microproc Arch</td>
<td>3</td>
</tr>
<tr>
<td>ET 152 Microcomp Interfacing &amp; Troubleshoot</td>
<td>3</td>
</tr>
<tr>
<td>TQM 103 Total Qual Management: Implement</td>
<td>3</td>
</tr>
</tbody>
</table>

Students should consult their counselor or program adviser to determine the total number of units and courses needed to fulfill graduation requirements.

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**Mechanical Engineering Technology**

**Degree Curriculum**

In the curriculum in Mechanical Engineering Technology, a two-year course of study, the Engineering and Technology Department offers students specialized training for employment as engineering technicians engaged in research, design, operation, maintenance, testing, or sales. Students in this curriculum complete the common core courses (see preceding Common Core). Specialization is offered from the second through the fourth semester. The program adviser works closely with each student to assure normal progress. Upon successful completion of the curriculum, students receive the Associate in Science degree and the Award of Achievement.

**Training in the Major.** Training in the first year is designed to provide students with a sound working knowledge of the principles of engineering drawing, applied mathematics, electrical circuits, physics, manufacturing methods, and computers. In the second year, students complete courses in computer-aided design (CAD), and computer-aided manufacturing (CAM).

**Employment.** Students who complete the curriculum satisfactorily are qualified for positions as estimator-designer, field engineer, assistant operating engineer, mechanical or research technician, junior test engineer or engineering sales representative. Positions to which graduates may advance after gaining experience and further training include those of senior estimator-designer, field engineer, operating engineer, manufacturing engineer, technical supervisor, or sales engineer.
Award of Achievement. Students who complete the curricu-

ulum with final grades of C or higher in their major technical
courses receive the Award of Achievement in Mechanical Engi-
neering Technology.

Technical Elective Courses for the Award of Achieve-
ment in Mechanical Engineering Technology

Students majoring in Mechanical Engineering Technology must
take a total of 20 elective units, 17 from the following list and 3
from any technical area.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET 181 CAD I</td>
<td>3</td>
</tr>
<tr>
<td>ET 182 CAD II</td>
<td>3</td>
</tr>
<tr>
<td>ET 183A CAD III</td>
<td>2</td>
</tr>
<tr>
<td>ET 183B CAD IV</td>
<td>2</td>
</tr>
<tr>
<td>ET 183C Adv CAD: 3D Modeling</td>
<td>2</td>
</tr>
<tr>
<td>ET 183D Adv CAD: Rendering &amp; Animation</td>
<td>2</td>
</tr>
<tr>
<td>ET 184 Structural CAD Drafting</td>
<td>3</td>
</tr>
<tr>
<td>ENGN 24 Design Graphics</td>
<td>3</td>
</tr>
<tr>
<td>ET 83 Engineering Drafting</td>
<td>2</td>
</tr>
<tr>
<td>ET 86 Intro to CAM</td>
<td>2</td>
</tr>
<tr>
<td>ET 140 Manufacturing-Process</td>
<td>3-6</td>
</tr>
<tr>
<td>ET 144 Welding Laboratory</td>
<td>3-6</td>
</tr>
<tr>
<td>ET 145 Intermediate Welding</td>
<td>3-6</td>
</tr>
<tr>
<td>ET 146 Manuf Blueprint Reading</td>
<td>3</td>
</tr>
<tr>
<td>TQM 103 Total Qual Management: Implement</td>
<td>3</td>
</tr>
</tbody>
</table>

Students should consult their counselor or program adviser to
dermine the total number of units and courses required to
fulfill graduation requirements.

Credit Toward Graduation. All credit that students earn in
obtaining the Certificate of Completion in any of the curricula
may be applied toward satisfaction of the requirements for
graduation from College.

Air Conditioning and Refrigeration
Requirements for the Certificate of Completion.
Students may obtain the Certificate of Completion in Air Condi-
tioning and Refrigeration by completing the following courses
with the average final grade of C (2.00 grade point average) or
higher. (The Engineering and Technology Department may
require students who have had limited training and experience
in air conditioning and refrigeration to complete additional
courses before awarding the Certificate of Completion.)

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET 135A Fund. of Air Cond. and Refrig.</td>
<td>2</td>
</tr>
<tr>
<td>ET 135B Fund. of Air Cond. and Refrig.</td>
<td>2</td>
</tr>
<tr>
<td>ET 135C Fund. of Air Cond. and Refrig.</td>
<td>2</td>
</tr>
<tr>
<td>ET 139C Engr'd. Plumbing Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

Drafting: Option I - CAD/CAM
Requirements for the Certificate of Completion.
Students may obtain the Certificate of Completion in CAD/
CAM by completing the following courses with a grade of C or
higher in each course. Students are expected to have basic
drafting and manufacturing processes skills. If not, they should
enroll in ET 104.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET 86 CAM I</td>
<td>2</td>
</tr>
<tr>
<td>ET 140 Manufacturing Processes</td>
<td>3</td>
</tr>
<tr>
<td>ET 181 CAD I</td>
<td>3</td>
</tr>
<tr>
<td>ET 182 CAD II</td>
<td>3</td>
</tr>
</tbody>
</table>

Drafting: Option II - Computer Aided Drafting (CAD)
Requirements for the Certificate of Completion.
Students may obtain the Certificate of Completion in Computer Aided Drafting by completing the following courses with a
grade of C or higher in each course. (Students are expected to
have basic drafting skills. If not, they should enroll in ET 104.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET 181 CAD I</td>
<td>3</td>
</tr>
<tr>
<td>ET 182 CAD II</td>
<td>3</td>
</tr>
<tr>
<td>And two courses from the following:</td>
<td></td>
</tr>
<tr>
<td>ET 85 CAD: Mechanical</td>
<td>2</td>
</tr>
<tr>
<td>ET 183A Adv CAD: Customization</td>
<td>2</td>
</tr>
<tr>
<td>ET 183B Adv: CAD: AutoLISP</td>
<td>2</td>
</tr>
<tr>
<td>ET 183C Adv CAD: 3D Modeling</td>
<td>2</td>
</tr>
<tr>
<td>ET 183D Adv CAD: Rendering &amp; Animation</td>
<td>2</td>
</tr>
<tr>
<td>ET184 Structural CAD Drafting</td>
<td>2</td>
</tr>
</tbody>
</table>
Electronics: Option I - Analog Electronics and Communication

Requirements for the Certificate of Completion.
Students may obtain the certificate of Completion in Analog Electronics and Communication by completing the following courses with a grade of C or higher in each course. A minimum of four of the courses must be taken at City College of San Francisco. (Students are expected to have mathematics training up to trigonometry.)

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET 60 Electronics I-DC/AC Circuit Analysis</td>
<td>4</td>
</tr>
<tr>
<td>ET 65 Electronics II-Linear Active Devices</td>
<td>4</td>
</tr>
<tr>
<td>ET 163 Non-sinusoidal Circuits</td>
<td>3</td>
</tr>
<tr>
<td>ET 164 Analog &amp; Commun Electro</td>
<td>4</td>
</tr>
<tr>
<td>ET 165 PCM/FM Commun System</td>
<td>3</td>
</tr>
</tbody>
</table>

Electronics: Option II - Digital Electronics

Requirements for the Certificate of Completion.
Students may obtain the Certificate of Completion in Digital Electronics by completing the following courses with a grade of C or higher in each course. A minimum of three of the courses must be taken at City College of San Francisco.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET 60 Electronics I-DC/AC Circuit Analysis</td>
<td>4</td>
</tr>
<tr>
<td>ET 63 Intro to Digital Circuit &amp; Techniques</td>
<td>3</td>
</tr>
<tr>
<td>ET 151 Assembly Lang. &amp; Microproc Arch</td>
<td>3</td>
</tr>
<tr>
<td>ET 152 Microcomp Interfacing &amp; Troubleshoot</td>
<td>3</td>
</tr>
</tbody>
</table>

Personal Computer Repair Technology

Requirements for the Certificate of Completion.
Students may obtain the Certificate of Completion in Personal Computer Repair Technology by completing the following courses with a grade of C or higher in each course. A minimum of three of the courses must be taken at City College of San Francisco.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET 60 Electronics I-DC/AC Circuit Analysis</td>
<td>4</td>
</tr>
<tr>
<td>ET 63 Intro to Digital Circuit &amp; Techniques</td>
<td>3</td>
</tr>
<tr>
<td>ET 54 Microcomp Setup, Maint &amp; Repair</td>
<td>2</td>
</tr>
<tr>
<td>ET 55 Adv Microcomp Repair</td>
<td>2</td>
</tr>
</tbody>
</table>

Engineered Plumbing Systems

Requirements for the Certificate of Completion.
Students may obtain the Certificate of Completion in Engineered Plumbing Systems by completing the following courses with the average final grade of C or higher. (The Engineering and Technology Department may require students who have had limited training and experience in dealing with engineered plumbing systems to complete additional courses before awarding the Certificate of Completion.)

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ET 139A Engineered Plumbing Systems</td>
<td>3</td>
</tr>
<tr>
<td>ET 139B Engineered Plumbing Systems</td>
<td>3</td>
</tr>
<tr>
<td>ET 139C Engineered Plumbing Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Quality Management (TQM)

Total Quality Management (TQM) certificate program is designed for those employed in product or service organizations who desire to gain TQM skills in order to analyze their work processes and management systems for improving the quality of their products and services.

This program is also developed for the students in all vocational programs to increase their employability.

Requirements for the Certificate of Completion. The completion of the following courses with a grade of C or higher. (For course description see Announcement of Courses under Business.)

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>TQM 101 TQM: Principles and Elements</td>
<td>3</td>
</tr>
<tr>
<td>TQM 103 TQM: The Implementation Process</td>
<td>3</td>
</tr>
</tbody>
</table>

Credit Toward Graduation. All credits that students earn in obtaining the Certificate of Completion in Total Quality Management (TQM) may be applied toward satisfaction of the requirement for graduation from college.

Combination Welding

Noncredit Program

Program Goal. Prepares students for welding plate, pipe, and sheet metal workers. Includes the study of electric arc, metal inert gas, tungsten inert gas, inner shield and oxyacetylene welding techniques.

Admission Requirements. High school diploma, GED, or high school proficiency certificate. Demonstration by exam of an 8th grade reading, math, and language level. Remedial courses may be taken concurrently as needed. For more information call 267-6570.

Core Course Hours/Weeks
TIWE 9676 Combi Weld (4 sect of 270 hr)........ 15/18
SECY 9356 Bus Math (as needed).................. 5/18
SECY 9346 Effective Bus Comm (as needed) ....... 5/18

Elective Courses. To be discussed with a counselor.

Requirements for Completion. Completion of required courses with grade C or higher. Credit by petition is available.
Engineering and Technology
Announcement of Courses

Engineering

CREDIT, DEGREE APPLICABLE COURSES:

ENGN 1A. Measurements and Plane Surveying (3)
Lec-2, lab-3
Prereq.: MATH 95 or ET 50 (ea. concur.)
Theory of and practice in linear and angular measurements. Equipment and methods used in common surveying measurements. Treatment of errors in measurements in surveying and other areas of engineering. CSU/UC/CAN: ENGR 10

ENGN 20. Introduction to Circuit Analysis (3)
Lec-5
Prereq.: MATH 110C (9C, 12, or 12B) and PHYC 4B (ea. concur.) and ENGN 20L (concur.)
Basic circuit analysis techniques. Introduction to electronic circuits. CSU/UC/CAN: ENGR 12; ENGR 20+20L: ENGR 6

ENGN 20L. Introduction to Circuit Analysis Laboratory (1)
Lab-3
Prereq.: ENGN 20 (concur.)
Laboratory experiments in circuit analysis. CSU/UC; CAN: ENGR 20+20L: ENGR 6

ENGN 24. Design Graphics (3)
Lec-1.5, lab-4.5, field trips
Prereq.: ET 50 or MATH 95 or HS trigonometry; ET 104 or 1 yr. HS mechanical drawing
Introduction to technical sketching, design, and engineering graphics; development of visualization skills by using computer aided drafting (CAD) software in conjunction with orthographic and presentation graphics; emphasis on computer aided design and graphical analytical methods with solutions to three-dimensional problems involving points, lines, surfaces, and solids. CSU/UC/CAN: ENGR 2

Lec-3
Prereq.: PHYC 4A, and MATH 110C (9C or 12 or 12B) (ea. concur.)
An introductory course in applied mechanics; analysis of forces acting on particles and rigid bodies in equilibrium. Designed to meet the professional needs of students majoring in engineering. Vector algebra, free body diagrams, centroids, shear and bending moment diagrams, moments of inertia and friction. CSU/UC/CAN: ENGR 8

ENGN 37. Engineering Mechanics-Dynamics (3) sp
Lec-3
Prereq: ENGN 36
Introduction to dynamics including both kinematics (the description of the position, velocity, and acceleration of a rigid body) and kinetics (the relationship between the forces acting on a rigid body and its velocity and acceleration). CSU/UC

ENGN 38. Introduction to Computing for Engineers (3)
Lec-4
Prereq.: MATH 110A, which may be taken concurrently, or ET 51 or MATH 100A
ENGN 38 and CIS 112 may not both be taken for credit.
Engineering problem solving using computer programming. Problem solving strategies, algorithm development and structured programming design. Solution of a variety of engineering problems from evaluating a simple function to modeling and simulation. Applications from mechanical, electrical and civil engineering. CSU/UC

ENGN 45. Materials Science (3)
Lec-2, lab-3
Prereq.: CHEM 101A or 103A, PHYC 4A-4AL, and ENGN 24
Advise: CHEM 101B or 103B, and PHYC 4B-4BL (ea. concur.)
An introductory course in the properties and science of engineering materials; application of basic principles in the selection and use of engineering materials. CSU/UC/CAN: ENGR 4

ENGN 48. The Engineering Students and Their Profession (1)
Lec-2
Required of all students majoring in engineering or engineering technology and highly recommended for students considering a major in engineering or engineering technology.
The history and development of engineering as a profession. A review of current trends and developments in engineering and engineering technology; educational requirements, employment opportunities, and projected trends in the various branches of engineering and engineering technology. CSU/UC

ENGN 48L. Introduction to Engineering and Technology - Laboratory (1)
Lab-3
A project-oriented, hands-on introduction to the practices and methodologies used in engineering and technology. Includes work in electronics, computer aided drafting, mechanical construction and fabrication, and technical mathematics. CSU

Engineering Technology

CREDIT, DEGREE APPLICABLE COURSES:

ET 50. Technical Mathematics (4)
Lec-4
Prereq.: HS intermediate algebra and trigonometry or MATH 92 or 90 and 95 (2 or 2B and 5).
Applied mathematics designed to develop ability to solve problems. Practical application of algebra, geometry, and trigonometry to basic problems in the applied sciences, including the study of alternating current circuitry, with emphasis on periodic functions, vector analysis, logarithms, and exponential functions. CSU

ET 51. Advanced Technical Mathematics (4) sp
Lec-4
Prereq.: ET 50
Instruction in applied mathematics and physical science designed to develop the student's ability to solve fundamental engineering problems in mechanics and electronics. Introduction to analytical geometry, statistics, and calculus. CSU
ET 54. Microcomputer Setup, Maintenance, and Repair (2)
Lec-1, lab-3
Prereq.: ET 50
Advise: Completion of a course in electronics or computer programming
This is a practical, hands-on course covering hardware maintenance of MS-DOS (PC, XT, AT, 386, 486, and Pentium) computers. Each student will have at least one computer to take apart, examine, test, diagnose, and load an operating system and other programs. CSU

ET 55. Advanced Microcomputer Repair (2)
Lec-1, lab-3
Prereq.: ET 54
Repeat: max. 6 units
This second course in PC hardware will concentrate on troubleshooting, interfacing, and upgrading of MS-DOS and Windows (PC, XT, AT, 386, 486 and Pentium) computers. A more detailed look at memory subsystems, interrupts, and memory and port addressing. SCSI, CD ROMs, sound cards, tape and disk backup systems, the hardware of local area networks, and methods of obtaining technical information. When time and hardware are available, Apple Macintoshs will also be studied. CSU

ET 60. Electronics I - DC and AC Circuit Analysis (4)
Lec-2, lab-6
Prereq.: ET 50 (concur.)
Principles of direct and alternating-current circuit analysis; electrical and magnetic fields applied to capacitance and inductance; emphasis on basic laws. Complementary laboratory work emphasizing circuit connections, instruments and measurements. CSU

ET 63. Introduction to Digital Circuits and Techniques (3) sp
Lec-2, lab-3
Prereq.: ET 50 and 60
Review of basic logic gates and number systems. Design, analysis, and troubleshooting of combinational logic circuits, decoders, multiplexers, adders, flip-flops, counters, and registers. CSU

ET 65. Electronics II - Linear Active Circuits (4) fa
Lec-2, lab-6
Prereq.: ET 60
Basic and industrial electronic devices and their application to analog electronics and industrial control processes. Semiconductor components; diodes, transistors, JFETs, MOSFETs, thyristors, photoelectric devices. Power supplies, amplifiers, timing circuits, operational amplifiers. CSU

ET 83. Engineering Drafting (2)
Lec-1, lab-3
Prereq.: ET 181
CAD applications in advanced mechanical drafting. CSU

ET 86. Introduction to Computer-Aided Manufacturing - CAM I (2)
Lec-1, lab-3
Prereq.: ET 104
Introduction to computer numerical control, training in G and M codes. Hands-on training on the CNC machines. Testing, debugging, and running programs. Processes used to describe product geometry in computer terms. CSU

ET 104. Introduction to Engineering Drawing and Manufacturing (3)
Lec-1.5, lab-4.5
Development of detailed drawings (electrical, electronic, and mechanical) for the fabrication of individual projects. Sheet metal shop practices; use of hand tools; measurement and layout techniques. Printed circuit board design and fabrication. Machine tools and machine shop operations. CSU

ET 122S. Lead in Construction, Supervisor/Contractor (1.5)
Lec-32 (tot.), lab-9 (tot.), field trips
CR/NCR avail.
Preparation for interim certification as CA lead in construction supervisor/contractor. Lead uses, sources, characteristics, hazards, and safety; PPE and hygiene; monitoring, regulations and work practices; insurance and liability; record keeping; contract preparations, specifications, and administration; community relations. CSU

ET 122W. Lead in Construction, Worker (1)
Lec-22 (tot.), lab-12 (tot.), field trips
CR/NCR avail.
Preparation for interim certification as CA lead in construction worker. Lead uses, sources, characteristics, hazards, and safety; PPE and hygiene; monitoring, regulations, and work practices. CSU

ET 124. Lead Awareness and Mitigation (1)
Lec-16 (tot.), lab-6 (tot.)
CR/NCR avail.
Short-term course: hands-on instruction in lead awareness in residential and commercial structures, preparation for California State and EPA certificates required to meet local mandates for lead-based paint awareness and mitigation. Modules meet local, state, and federal awareness training requirements. CSU

ET 125 A-D. Field Experience in Environmental Technology (2)
Work-10, field trips
CR/NCR avail.
Supervised work experience involving environmental technologies, regulation, procedures, or fieldwork. CSU
ET 135A. Fundamentals of Air Conditioning and Refrigeration (2)
Lec-1.5, lab-1.5
Prereq.: PHYC 51 and 52
The psychrometrics of air and water-vapor mixtures, basic elements of air conditioning, and psychometric processes. Use of psychrometric instruments and measurement of the processes involved in the air conditioning system in the laboratory. CSU
One of a series of three courses [See also ET 135B and 135C] designed to accommodate engineering and technical students with varying backgrounds and work experience who wish to learn the basic concepts of air conditioning and refrigeration. Emphasis on practical engineering problems with laboratory sessions for demonstration of equipment and practical laboratory experiments.

ET 135B. Fundamentals of Air Conditioning and Refrigeration (2)
Lec-1.5, Lab-1.5
Prereq.: PHYC 40
Cooling loads, heat transfer equipment, air handling equipment, and the design of air-conditioning systems. Application of air-conditioning equipment, components, and control system of the air-conditioning system in the laboratory. Instruments and instrumentation for measuring air flow. CSU
One of a series of three courses. [See also ET 135A and 135C]

ET 135C. Fundamentals of Air Conditioning and Refrigeration (2)
Lec-1.5, lab-1.5
Prereq.: PHYC 40
The refrigeration cycle, refrigeration systems, heat transfer components, and control systems. Laboratory work in operational characteristics; analysis of refrigeration system; and methods of measuring pressure, temperature, and flow rates within the system. CSU
One of a series of three courses. [See also ET 135A and 135B]

ET 139A. Engineered Plumbing Systems (3)
Lec-3, field trips
Flow of liquids in drainage piping, sizing drainage systems, flow of air in vent piping, sewer systems, national and local codes, specifications and case problems. CSU

ET 139B. Engineered Plumbing Systems (3)
Lec-3, field trips
Pressurized water, automatic fire sprinkler, wet and dry standpipe, fuel gas in buildings. Centrifugal pumps, national and local plumbing and fuel gas codes, specifications and case problems. CSU

ET 139C. Engineered Plumbing Systems (3)
Lec-3
Review of plumbing, engineering design, codes, and specifications. Special projects in the field of plumbing engineering design. Copper system design. CSU

ET 140. Manufacturing Processes (3)
Lec-1.5, lab-4.5
Repeat: max. 9 units
Open to students not majoring in engineering
Elementary machine-tool practice, with special emphasis on the use of the lathe engine, horizontal and vertical milling machines, and drill press. CSU

ET 144. Welding Processes (3)
Lec-1.5, lab-4.5
Repeat: max. 9 units
Instruction in joining metal by welding. Laboratory practice in arc welding, inert-gas shielded welding (TIG and MIG). Oxygen-acetylene cutting and physical testing of welds. CSU

ET 145. Intermediate Welding Processes (3)
Lec-1.5, lab-4.5
Repeat: max. 6 units
Intermediate laboratory practice in arc welding, inert-gas shielded welding, micro-wire welding, oxyacetylene welding and cutting, brazing, aluminum welding and brazing, and physical testing of welds. Preparation for meeting State Welding Certification requirements. CSU

ET 146. Manufacturing Blueprint Reading (3)
Lec-3
Basic skills in reading blueprints for both fabrication and manufacturing. Related math and uses of measuring tools. Weld symbols, basic lines and views, basic joints for weldment fabrications. CSU

ET 151. Assembly Language and Microprocessors Architecture (3) fa
Lec-2, lab-3
Prereq.: ET 63 or equivalent
Microcomputer theory, design, and architecture using the IBM XT as an example system. Specific topics include: MS DOS, the Intel 8088 architecture and assembly language programming, using assemblers, architecture of the XT, memory, design of I/O ports, programmable peripheral integrated circuits, and software interrupts. Software and hardware troubleshooting techniques. CSU

ET 152. Microprocessor Interfacing and Troubleshooting (3) sp
Lec-2, lab-3
Prereq.: ET 151
Theory and laboratory work covering the operation, design and troubleshooting of microprocessor interfaces, A/D, D/A, interrupts, DMA, floppy and hard disks, serial communication, and an introduction to local area networks. The Intel 8088 and an XT clone computer will be studied as an example system. CSU

ET 163. Nonsinusoidal Circuits (3)
Lec-2, lab-3
Prereq.: ET 63 and 65 (concur.)
Waveform analysis, measurements and errors in the time and frequency domain, applications of operational amplifiers, wave-shaping and multivibrator circuits, SCRs and Triacs; emphasis on high-speed on high-speed pulse measurement techniques. Practice in the use of pulse and function generators, associated test equipment and accessories. CSU
ET 164. Analog and Communication Electronics (4)
SP
Lec-2, lab-6
Prereq.: ET 65
Theory and laboratory work covering class B amplifiers, differential amplifiers, negative feedback, distortion, stability, oscillators, class C amplifiers, mixers, and the am radio receiver. CSU

ET 165. PCM/FM Communication System (3) fa
Lec-2, lab-3
Prereq.: ET 164
Theory and laboratory work covering time domain and frequency domain analysis of FM system (wide-band and narrow-band FM). Pulse coded modulation (PCM) in digital communication: sampling theorem coding and non-linear coding and communication multiplexings. CSU

ET 181. Introduction to Computer Aided Drafting -
CAD I (3)
Lec-1.5, lab-4.5
Prereq.: ET 104 or 1 yr HS drafting
Students must have an understanding of orthographic projection, isometric drawing techniques and dimensioning according to ANSI standards
Introduction to CAD hardware and software operations and their applications in drafting; basic shape description, display, edit and dimensioning. CSU

ET 182. Intermediate Computer Aided Drafting - CAD
II (3)
Lec-1.5, lab-4.5
Prereq.: ET 181 or 100 hours of industrial work experience in basic AutoCad applications on mechanical orthographic projection, dimension per ANSI standards, and isometric drawing.
Industrial application of AutoCAD drawing editor on large scale projects including blocks, attributes and extraction of "non-graphic" data stored within the drawing files. Control of display to reduce regeneration time through efficient drawing methods. Three-dimensional coordinate system and the application of wire-frame and surface modeling of design concept geometry. Operation of various hardcopy output devices including pen plotting and printer plotting. CSU

ET 183B. Advanced Computer-Aided Drafting CAD IV
-AutoLISP (2)
Lec-1, lab-3
Prereq.: ET 182 or 200 hours of AutoCAD industrial work experience
An introduction to programming in AutoLISP for use with AutoCAD. Instruction in the use of AutoLISP programs. Development of new programs to improve drawing productivity by enhancing capabilities of AutoCAD. CSU

ET 183C. Advanced Computer-Aided Drafting: 3D
Modeling (2)
Lec-1, lab-3
Prereq.: ET 181 or 100 hours of AutoCAD industrial work experience
Introduction to three-dimensional (3D) modeling, application of computer-aided drafting software for the creation of wireframe, surface, and solid modeling. CSU

ET 183D. Advanced Computer-Aided Drafting:
Rendering and Animation (2)
Lec-1, lab-3
Prereq.: ET 181 or 100 hours of industrial work experience in basic AutoCAD
Introduction to computer generated rendered images and animation. CSU

ET 184. Structural CAD Drafting (2)
Lec-1, lab-3
Prereq.: ARCH 52 or ET 181 or equivalent training
Structural design theory. Use of CAD to generate steel and concrete details. Use of "STRUCALC" software for structural design. CSU

ET 186. Introduction to Geographical Information
Systems (GIS) Applications (2)
Lec-1, lab-3
This is a foundation course for the use of GIS software. It covers the history, structure, uses, hardware and software requirements, and basic operation of GIS. It also introduces Global Positioning Systems. CSU
ET 186 = GEOG 186

Total Quality Management (TQM)
CREDIT, DEGREE APPLICABLE COURSES:

TQM 101. Total Quality Management: Principles and
Elements (3)
Lec-3
Recommended for students from all disciplines.
Total Quality Management (TQM) is the systematic approach to constant improvement throughout an organization. TQM strives to provide customers with products and services that continually meet or exceed their expectations for quality. An introduction to the philosophy, the Deming 14 points, teamwork and group processes, problem-solving tools and techniques for implementing Total Quality Management, and ethics involved in changing employer-employee relationships. CSU
TQM 103. Total Quality Management: The Implementation Process (3)
Lec-3
Prereq.: TQM 101, Math E or equivalent (concur.)
The study of General Systems Theory; process and analysis using the techniques of process flow diagramming and essential structure analysis; emphasis on statistical process control (SPC) charts for data collection and analysis; application of Total Quality Management in service organizations; development of inventory control systems using Material Requirements Planning (MRP) or Just-In-Time (JIT); team building and group facilitation, employee empowerment and evaluation system; continuing exploration of the ethical issues of Total Quality Management involving supplier relationships and fair market competition. CSU

NONCREDIT COURSES:
TQMP 9490. Total Quality Management: Philosophy (18 hrs)
Total Quality Management (TQM) is the systematic approach to constant improvement throughout an organization. Discussion of Deming’s 14 points and the impact they can have on an organization.

TQMP 9491. Total Quality Management: Tools I (18 hrs)
Total Quality Management (TQM) is the systematic approach to constant improvements throughout an organization. Introduction of elementary quality improvement tools.

TQMP 9492. Total Quality Management: Values (18 hrs)
Total Quality Management (TQM) is the systematic approach to constant improvement throughout an organization. Discussion of principles, values, strategies, and tactics associated with any process improvement initiative in an organization. Applicable to both manufacturing and service organizations.

TQMP 9493. Total Quality Management: Tools II (18 hrs)
Total Quality Management is the systematic approach to constant improvement throughout an organization. Intermediate Statistical Process Control (SPC) tools such as several types of variable and attribute control charts and their applications in continuous quality improvement (CQI) activities.

Welding
NONCREDIT COURSES:
TIWE 9676. Combination Welding
Prereq.: ABE 2074
Lab/lecture course designed to prepare students for entry into the trade as combination welders. Emphasizes safety, certification preparation, and relevant theory as it applies to industry. Students will weld a variety of metals using a combination of welding processes such as: gas, stick (SMAW), MIG, TIG, innershield, along with metal cutting and gouging.

TIWE 9677. Welding Gas/MIG/TIG/Pipe
Preparation for employment in the welding industry. Welding plate metal, sheet metal, sheet metal and pipe in flat, horizontal, vertical, and overhead positions. Five major welding processes and two cutting processes: oxy-acetylene welding, shielded metal arc welding, gas tungsten arc welding, gas metal arc welding, flux cored arc welding, and oxy-acetylene cutting and gouging. Instruction includes safety, terminology, applicable welding theory, blueprint reading, and related math.

TIWE 9680. Welding Blueprint Reading (54 hrs)
Prereq.: ESLN 3800; ABE 2074
Interpretation of blueprints, welding symbols and material specifications. Students will be able to read blueprint format and interpret material specifications, identify weld symbols and sizes and develop basic techniques in sketching.

English
Announcement of Courses
A placement test is required of students prior to enrollment in most English courses. Students with a Bachelor’s degree from a four-year college or university, or an AP score of 3 or higher, or a verbal SAT score (before April 1995) of 510 or higher, or a score of 660 or higher (after April 1995) on the SAT II (Writing Subject Test) may not need to take an English placement test and should see the English Eligibility Coordinator in Room 514, Batmale Hall. Questions concerning status or exceptions should be directed to the English Eligibility Coordinator.

The sequence of composition courses in English is 90, 92, 94, 96, 1A, 1B. Depending upon their initial placement in English and depending upon their educational goals, students may be required to complete one or more of these courses for graduation from City College or for transfer to a four-year college or university.

Students whose scores in the City College English placement examination are low are generally assigned to either English 90, 94, or 96. Students for whom English is a second language may be required to take ESL (English as a Second Language) courses. Foreign students whose command of English is inadequate must take the courses that the English Department requires, most frequently ESL. Students who complete a course or sequence in English with a final grade of C or higher may not enroll in an equivalent or less advanced course in English. The Department Head of the English Department will rule on all matters of equivalency in connection with the College requirement in English.

For information about the English Eligibility Essay Exam, students should see the English Eligibility Coordinator in room 514, Batmale Hall.

CREDIT, NON-DEGREE APPLICABLE COURSES:
ENGL K. Pronunciation, Spelling and Reading Skills (3)
Lec-3, conf-1, lab-1
Not recommended for students who are enrolled in ESL 22 through 58
ENGL L or ENGL 9 may be taken concurrently
Concentration on the rules of English phonics and word attack skills and development of adequate comprehension, reading rate, and vocabulary.