

**Cabrillo College courses for students interested in
the Makerspace and maker-related internships**

These are the classes most likely to provide students with maker-related and digital fabrication skills. However, students might develop skills in even more classes than these, particularly if their field of training involves the communication of 3D form and process.

AP/ART/AH/DANCE/DM/MUSIC/TA 79 Creative Careers-Discovering Self-Directed Pathways
3 units; 3 hours Lecture, 1 hour Laboratory Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Investigates creative career opportunities in all visual, applied, and performing arts disciplines, with a focus on unique, self-directed, non-traditional, and entrepreneurial pathways and the academic and life choices necessary to realize such opportunities. May be offered in a Distance-Learning Format. Materials fee may apply. AH 79, ART 79, AP 79, DANCE 79, DM 79, MUS 79, and TA 79 are cross listed courses. Students may enroll in only one course for credit.

ART 5 Beginning Design: 3-Dimensional Form

3 units; 2 hours Lecture, 4 hours Laboratory Hybrid Requisite: Completion of or concurrent enrollment in ART 50L. Recommended Prep: Eligibility for ENGL 100 or ESL 100 and READ 100. Teaches design elements and principles used in 3-dimensional artwork and sculpture. Includes projects in various media: plaster, paper, wood, and metal.

ART 7C Advanced Wheel-Forming, Ceramic Surfaces and Kiln-Firing

1 – 3 units; 0.67 – 2 hours Lecture, 1.33 – 4 hours Laboratory Prerequisite: ART 7B or equivalent skills (portfolio review). Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Continues the study of clay processes covering wheel throwing methods, ceramic surfaces, and kiln-firing procedure and practice.

ART 8A Small Scale Metal/Jewelry

3 units; 2 hours Lecture, 4 hours Laboratory Hybrid Requisite: Completion of or concurrent enrollment in ART 50L. Recommended Preparation: ART 4 or ART 5; Eligibility for ENGL 100 or ESL 100 and READ 100. Teaches basic metal arts and jewelry making processes used in fabricating nonferrous metals. No casting. Attention paid to design, use of tools, supply sources, as well as development of technical skills.

ART 11B Intermediate Casting: Small Scale Metal/Jewelry

3 units; 2 hours Lecture, 4 hours Laboratory Prerequisite: ART 11A. Hybrid Requisite: Completion of or concurrent enrollment in ART 51L. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Presents increased complexity in non ferrous small scale metals casting technologies.

ART 25B Intermediate Woodworking/ Furniture Design

1 – 3 units; 0.67 – 2 hours Lecture, 1.33 – 4 hours Laboratory Prerequisite: ART 25A. Hybrid Requisite: Completion of or concurrent enrollment in ART 51L. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Continues the study of concepts and techniques of furniture making covered in ART 25A. Emphasizes explorations in mixed media and alternative materials in furniture making. Students will engage in more advanced design concepts (ergonomics) and woodworking techniques.

ART 25CA Advanced Woodworking/ Furniture Design

1 – 3 units; 0.67 – 2 hours Lecture, 1.33 – 4 hours Laboratory Prerequisite: ART 25B. Hybrid Requisite: Completion of or concurrent enrollment in ART 51L. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Develops a complex investigation of design concepts and technical skills for woodworking and furniture making. Building on practices covered in ART 25B, this course explores mixed media and alternative materials, bent lamination construction, material formulation for custom finishes.

ART 26B Fabrication II: Small Scale Metal/ Jewelry

3 units; 2 hours Lecture, 4 hours Laboratory Prerequisite: ART 26A. Hybrid Requisite: Completion of or concurrent enrollment in ART 51L. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Presents non ferrous metal decorative and structural fabrication through heat fusion technologies, ancient and contemporary.

ART 34A Sculpture: Direct Processes I

3 units; 2 hours Lecture, 4 hours Laboratory Prerequisite: ART 34B or equivalent skills. Prerequisite: ART 5. Hybrid Requisite: Completion of or concurrent enrollment in ART 51L. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Introduces beginning level materials and processes in sculpture. Materials fee may apply.

ART 34B Sculpture: Direct Processes II

3 units; 2 hours Lecture, 4 hours Laboratory Prerequisite: ART 34A. Hybrid Requisite: Completion of or concurrent enrollment in ART 51L. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Continues the study of materials and processes from ART 34A with an increased use of a wide variety of materials, which can be sculpted through direct processes. Emphasizes the application of concepts and presentation.

ART 34C Sculpture: Direct Process III

3 units; 2 hours Lecture, 4 hours Laboratory Prerequisite: ART 34B or equivalent skills. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Continues the study of sculptural processes from ART 34B with an increased awareness of materials, which can be transformed through direct approach. Emphasizes the application of concept and presentation.

ART 35 Sculpture: Casting

1 – 3 units; 0.67 – 2 hours Lecture, 1.33 – 4 hours Laboratory Prerequisite: ART 34A. Hybrid Requisite: Completion of or concurrent enrollment in ART 51L. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Teaches bronze casting for sculptural purposes, utilizing lost wax method and rigid investments. Includes patination and presentation.

ART 36 Sculpture: Moldmaking

1 – 3 units; 0.67 – 2 hours Lecture, 1.33 – 4 hours Laboratory Prerequisite: ART 5. Hybrid Requisite: Completion of or concurrent enrollment in ART 51L. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Introduces moldmaking with an emphasis on constructing armatures, bas-relief, waste, piece and flexible mold types using suitable materials in both positive and negative mode. Presentation of finished sculpture is included as part of the course.

ART 38B Metalsmithing II

3 units; 2 hours Lecture, 4 hours Laboratory Prerequisite: ART 38A. Hybrid Requisite: Completion of or concurrent enrollment in ART 51L. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Continues development of non ferrous small scale metal and jewelry art forming technologies.

ART 65A Illumination: Lighting Fabrication

1 – 3 units; 0.67 – 2 hours Lecture, 1.33 – 4 hours Laboratory Prerequisite: ART 2A and ART 5. Hybrid Requisite: Completion of or concurrent enrollment in ART 51L. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Explores the conceptual, functional, and aesthetic components of lighting design and fabrication. Includes an overview of historical and contemporary lighting solutions. Non-traditional materials will be encouraged, and each student will keep a sketchbook journal which will serve as a source for the development of ideas and potential solutions.

ART 95A Survey of Digital Fabrication for Studio Arts

1 – 3 units; 0.67 – 2 hours Lecture, 1.33 – 4 hours Laboratory Prerequisite: ART 5. Hybrid Requisite: Completion of or concurrent enrollment in ART 51L. Eligibility for ENGL 100 or ESL 100 and READ 100. Surveys creative applications of computer-aided fabrication technologies for studio arts including 3D printing hardware and software, and other related fabrication technologies.

ART 95B Beginning Digital Fabrication for Studio Arts

1 – 3 units; 0.67 – 2 hours Lecture, 1.33 – 4 hours Laboratory Prerequisite: ART 95A. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Investigates methods for fabricating objects

utilizing open-source models to create objects with computer-aided fabrication technologies. Introduces basic 3D modeling software as a tool for creative art making.

ART 196A Beginning 3D Modeling for Digital Fabrication in Art

3 units; 2 hours Lecture, 4 hours Laboratory Prerequisite: ART 95B. Hybrid Requisite: Completion of or concurrent enrollment in ART 51L Recommended Preparation Eligibility for ENGL 100 or ESL 100 or READ 100. Teaches techniques and processes to create 3D computer models for art fabrication. Includes exercises assignments and projects designed to build skill levels with 3D computer modeling tools and software.

ART 196B Intermediate 3D Modeling for Digital Fabrication in Art

3 units; 2 hours Lecture, 4 hours Laboratory Prerequisite: ART 196A. Hybrid Requisite: Completion of or concurrent enrollment in ART 51L Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Continues 3D modeling and fabrication studies from ART 196A with a focus on specialized tools for intricate model making, combining 3D modeling practice with traditional art making, and individual project development.

BUS 88 Starting and Operating a New Small Business

3 units; 3 hours Lecture, 1 hour Laboratory Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Teaches skills to succeed in new ventures: legal steps, paperwork, start-up capital, demand, pricing, business feasibility, location, expenses, cash flow, marketing and business plan.

CEM 155 Blueprint Reading

3 units; 3 hours Lecture Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100; Eligibility for MATH 154. Teaches the analysis and interpretation of construction drawings. Topics include the alphabet of lines, symbols, plot plans, foundation plans, floor plans, elevations, sectionals, framing details, and dealing with incomplete and inaccurate drawings. New construction and remodels both residential and commercial are covered.

DM 1 Introduction to Digital Media

4 units; 3 hours Lecture, 2 hours Laboratory Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Introduces digital media from historical and contemporary perspectives, emphasizing practical fundamentals of design, the production process, and creative technology applications. Topics include concepts, trends, content, methods, forms, careers, and delivery of digital media for print, screen display, and interactivity.

DM 3 Design in Society

3 units; 3 hours Lecture Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Studies design theory and practice, emphasizing creative solutions for producing visual communication and useful objects for commerce, culture, and entertainment.

DM 4 Digital Graphics

4 units; 3 hours Lecture, 2 hours Laboratory Prerequisite: DM 1 or equivalent skills. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Introduces creation and editing of digital graphics, illustrations, photographs, and applied color theory for pre-press production and screenbased media.

ENGR 12 Machining Processes

1.5 unit; 1 hour Lecture, 2 hours Laboratory Recommended Preparation: ENGL 100 or ESL 100 and ENGL 100L or Assessment into ENGL 1A; READ 100. Provides hands-on experience with fabrication of mechanical components and assemblies using conventional, automatic, and numerical control tools. Identifies hazards associated with specific machine tools and processes, and ways of reducing risk of injury.

ENGR 25 Graphics and Design

4 units; 3 hours Lecture, 3 hours Laboratory Prerequisite: MATH 153 or MATH 3 or MATH 4 or high school geometry. Recommended Preparation: ENGL 100 or ESL 100 and ENGL 100L or Assessment into ENGL 1A; READ 100. Applies principles of engineering drawing in visually communicating engineering designs using freehand sketching, instrument drawing, and computer-aided drafting/design using AutoCAD. Topics include orthographic and pictorial drawings; descriptive geometry; detail and assembly drawings; dimensioning and

tolerancing; and scales. Acquire an in-depth understanding of the engineering design process and improve creativity in solving engineering problems

ENGR 26 Solid Modeling

1 unit; 3 hours Laboratory Hybrid Requisite: Completion of or concurrent enrollment in ENGR 25. Recommended Preparation: ENGL 100 or ESL 100 and ENGL 100L or Assessment into ENGL 1A; READ 100. Applies principles of solid modeling using Creo Parametric in engineering design and the production of engineering drawings. Construct parts, solid models, and assemblies. Plot three-dimensional drawings and dimensioned orthographic drawings. Produce engineering documentation packages.

ENGR 45 Engineering Materials

4 units; 3 hours Lecture, 3 hours Laboratory Prerequisite: PHYS 4A and CHEM 1A and ENGL 1A/1AH/1AMC/1AMCH. Recommended Preparation: ENGR 10 and CHEM 1B and READ 100. Presents the properties and performance of engineering materials and their relationship to the internal structure of materials. Applies the concepts of material science and engineering in testing materials using laboratory testing equipment. Utilizes analysis techniques in selecting the appropriate materials to meet engineering design criteria. Engineering materials include metals, polymers, ceramics, composites, and semiconductors.

ETECH 31 Introduction to Electronic Circuit and Schematic Design

3 units; 2 hours Lecture, 4 hours Laboratory Prerequisite: ETECH 24 or equivalent skills. Recommended Preparation: CABT 106; Eligibility for ENGL 100 or ESL 100 and READ 100. Presents the use of computer aided drafting software for the design of electronic diagrams, including schematics, wiring diagrams, block diagrams, and printed circuit fabrication drawings. Includes instruction on symbol creation, symbol library maintenance, and hands-on basic electronics.

ETECH 41 Advanced AutoCAD

3 units; 2 hours Lecture, 4 hours Laboratory Prerequisite: ETECH 24 or equivalent skills. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Presents a second level AutoCAD and first level mechanical drafting course. Includes an introduction to the computer aided design of mechanical drawings, detailing the fabrication of mechanical parts, technical sketching, multi-view orthographics, section views, auxiliary views, 3D modeling, dimensioning, and an introduction to computer aided manufacturing.

ETECH 126 3D Solid Modeling and Rendering

3 units; 2 hours Lecture, 4 hours Laboratory Prerequisite: ETECH 24 or equivalent skills. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Covers the use of computer aided design software for 3-dimensional solid modeling and rendering of mechanical and architectural designs, including shaded and photorealistic rendering. Ability to use CAD software to draw 2D shapes, revise 2D drawings, dimension 2D drawings, and plot 2D drawings is required.

ETECH 130 Introduction to Creo and Solidworks

3 units; 2 hours Lecture, 4 hours Laboratory Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Covers an introduction to the fundamental operating principles of Creo and Solidworks software applications. Uses Creo and Solidworks for Windows to create and revise drawings. This is a foundation course that can lead to advanced study in a variety of drafting and design fields.

ETECH 131 Intermediate Creo and Solidworks

3 units; 2 hours Lecture, 4 hours Laboratory Prerequisite: ETECH 130. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Covers intermediate-level operating principles of Creo and Solidworks software applications. Uses Creo and Solidworks for Windows to create and revise drawings. The second of a two part Creo and Solidworks course series.

ETECH 140 3D Animation

3 units; 2 hours Lecture, 4 hours Laboratory Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Introduces theories and techniques of 3D computer animation. Includes an introduction to 3D model construction, animation, rigging, simulation, motion capture and rendering.

ETECH 141 Intermediate 3D Animation

3 units; 2 hours Lecture, 4 hours Laboratory Prerequisite: ETECH 140. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Presents a second-level course in the use of 3D animation software to create animation using 3D computer models. Includes advanced 3D model construction, rendering, and animation using camera, target and object motion.

ETECH 150 ETECH Careers and Employment Preparation

2 units; 1 hour Lecture, 3 hours Laboratory Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100. Presents a review of current trends/developments in the engineering technology field with focus on skill set requirements, employment opportunities, and projected job trends associated with the various Engineering Technology branches. Mock interviews, portfolio building, and resume creation will be completed during lab sessions.

W 150 Arc Welding

2 units; 1 hour Lecture, 3 hours Laboratory Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100; Eligibility for MATH 154. Introduces basic arc welding skills with an emphasis on safety, oxy-acetylene cutting, shielded metal arc welding, and GMAW (MIG) welding techniques.

W 151 TIG Welding

2 units; 1 hour Lecture, 3 hours Laboratory Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100; Eligibility for MATH 154. Presents basic training in the flat and out-of-position welding of steels, aluminum, and stainless steel with the GTAW process.

W 152 Advanced Welding

2 units; 1 hour Lecture, 3 hours Laboratory Prerequisite: W 150 or W 151 or equivalent skills. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100; Eligibility for MATH 154. Continues training in arc and gas welding in various positions; introduces MIG welding, TIG welding, flux cored arc welding and flame cutting.

W 152A Advanced Arc Welding

1 unit; 3 hours Laboratory Prerequisite: W 152 or equivalent skills. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100; Eligibility for MATH 154. Presents continued advanced training in SMAW (Stick) welding techniques, focusing on the 3G and 4G positions with low hydrogen electrodes, enabling students to pass sample AWS welding code tests.

W 152B Advanced MIG Welding

1 unit; 3 hours Laboratory Prerequisite: W 152 or equivalent skills. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100; Eligibility for MATH 154. Continues advanced training in GMAW (MIG) welding techniques, focusing on all positions and sheet steel gages, in preparation for light gage fabrication and body-fender repair applications.

W 152C Advanced TIG Welding

1 unit; 3 hours Laboratory Prerequisite: W 152 or equivalent skills. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100; Eligibility for MATH 154. Continues advanced training in GTAW (TIG) welding techniques, focusing on all position welding of sheet gauge materials in steel, aluminum, and stainless steels.

W 156 Introduction to Sheet Metal Fabrication

2 units; 1 hour Lecture, 3 hours Laboratory Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100; Eligibility for MATH 154. Presents an introduction to and basic training in metal forming, fastening, and blueprint reading skills. Develops thorough knowledge of use and application of related equipment.

W 158 Welding Fabrication

2 units; 1 hour Lecture, 3 hours Laboratory Prerequisite: W 150 or W 151. Recommended Preparation: Eligibility for ENGL 100 or ESL 100 and READ 100; Eligibility for MATH 154. Presents advanced training in steel

fabrication utilizing state-of-the-art welding processes with emphasis on blueprint interpretation and welding codes.

Source: Cabrillo College Catalog 2017-2018