

Modern Making

Overview

The modern making curriculum at Folsom Lake College is ideal for makers, artists, entrepreneurs, educators, hobbyists, inventors, and anyone interested in enhancing and developing marketable job skills, solving problems, developing products, improving business processes, or creating works of art using state-of-the-art digital fabrication tools and techniques.



Career Options

- Artist
- Educator
- Engineer
- Entrepreneur
- Product Designer
- Programmer
- Researcher
- Small Business Owner

Some career options may require more than two years of college study.

Highlights

- Talented faculty with practical experience and expertise
- Hands-on experience in a wide variety of digital fabrication tools and techniques
- A comprehensive on-campus makerspace, the [Innovation Center \(/about-us/our-facilities/innovation-center-makerspace\)](/about-us/our-facilities/innovation-center-makerspace)

Program Maps

[Science, Technology, Engineering, and Mathematics Undecided Major \(/frc/main/doc/instruction/program-maps/STEM-Uncecided-major.pdf\)](/frc/main/doc/instruction/program-maps/STEM-Uncecided-major.pdf)

[Modern Making, Certificate of Achievement \(/flc/main/doc/instruction/program-maps/Modern-Making-Certificate.pdf\)](/flc/main/doc/instruction/program-maps/Modern-Making-Certificate.pdf)

[Modern Making, Digital Fabrication, Certificate \(/flc/main/doc/instruction/program-maps/Digital-Fabrication-Certificate.pdf\)](/flc/main/doc/instruction/program-maps/Digital-Fabrication-Certificate.pdf)

[Modern Making, Physical Computing and the Internet of Things, Certificate \(/flc/main/doc/instruction/program-maps/Physical-Computing-and-the-Internet-of-Things-Certificate.pdf\)](/flc/main/doc/instruction/program-maps/Physical-Computing-and-the-Internet-of-Things-Certificate.pdf)

Dean [Greg McCormac \(/about-us/contact-us/faculty-and-staff-directory/greg-mccormac\)](/about-us/contact-us/faculty-and-staff-directory/greg-mccormac)

Department Chair [Zack Dowell \(/about-us/contact-us/faculty-and-staff-directory/zack-dowell\)](/about-us/contact-us/faculty-and-staff-directory/zack-dowell)

Meta-Major [Science, Technology, Engineering, and Mathematics \(/academics/meta-majors/science-technology-engineering-and-mathematics\)](/academics/meta-majors/science-technology-engineering-and-mathematics)

Phone (916) 608-6615

Email [mccormg@flc.losrios.edu \(mailto:mccormg@flc.losrios.edu\)](mailto:mccormg@flc.losrios.edu)

Certificate of Achievement

Modern Making Certificate

The certificate in Modern Making combines hands-on experience in modern making technologies with design thinking, enabling the development of creative prototypes and projects.

Students will gain experience in modern making technologies, techniques, materials and production processes, including digital fabrication and physical computing.

The Modern Making certificate is ideal for entrepreneurs developing products and services, artists creating interactive installations, educators developing STEM activities for use in the classroom, hobbyists, makers, inventors, and anyone interested in enhancing job skills and solving real-world problems.

Catalog Date: June 1, 2020

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
MAKR 100	Introduction to Microcontrollers and Physical Computing	3
MAKR 101	The Internet of Things	3
MAKR 110	3D Design for Additive Manufacturing	3
MAKR 111	Digital Fabrication	3
MAKR 290	Modern Making Capstone Project	1
A minimum of 3 units from the following:		3
BUS 357	Entrepreneurship, Innovation, and New Enterprise Development (3)	
ECE 452	Making for Educators (3)	
SOC 379	Making Social Change (3)	
TA 420	Stagecraft (3)	
TA 423	Introduction to Scene Design for the Stage (3)	
Total Units:		16

Student Learning Outcomes

Upon completion of this program, the student will be able to:

- evaluate physical computing and Internet of Things products, services and devices, and choose appropriate technologies for a given application.
- utilize software, microcontrollers, and related electronic components to create interactive objects, prototypes and devices that integrate programming, networking, sensing, and actuation and that respond to environmental and user inputs.
- evaluate various digital fabrication technologies, techniques, and materials and select the appropriate approach or combination of approaches for a given application or to solve a particular problem.
- utilize a variety of tools to create, modify, adapt and prepare files for production using digital fabrication technologies, including 3D printing, laser cutting, and Computer Numerical Control (CNC) milling.
- apply design thinking and the tools, techniques and technologies of digital fabrication, physical computing and the internet of things to develop prototypes and solutions across disciplines.

Certificates

Digital Fabrication Certificate

Digital fabrication is the process of translating a digital design developed on a computer into a physical object, using a variety of techniques, equipment, materials and production processes. Students completing the Digital Fabrication certificate will develop experience with design, development and production of physical objects, using a combination of hardware and software.

The Digital Fabrication certificate is ideal for makers, artists, entrepreneurs, educators, hobbyists, inventors, and anyone interested in enhancing job skills, solving problems, developing products, improving business processes, or creating works of art.

Catalog Date: June 1, 2020

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
MAKR 110	3D Design for Additive Manufacturing	3
MAKR 111	Digital Fabrication	3
Total Units:		6

Student Learning Outcomes

Upon completion of this program, the student will be able to:

- evaluate various digital fabrication technologies, techniques, and materials and select the appropriate approach or combination of approaches for a given application or to solve a particular problem.
- design and develop conceptual and functional prototypes that meet project requirements, using the principles of design thinking.
- utilize a variety of tools to create, modify, adapt and prepare files for production using digital fabrication technologies, including 3D printing, laser cutting, and Computer Numerical Control (CNC) milling.

Physical Computing and the Internet of Things Certificate

Physical Computing and the Internet of Things (IoT) are terms used to describe the internetworking of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. Examples of physical computing and IoT devices include home automation systems, remote monitoring solutions, and "smart" devices of all kinds.

Upon completing this hands-on certificate, students will have a solid foundation in physical computing and IoT techniques and technologies, including evaluating devices and services, the use of microcontrollers, developing and modifying programming code, using sensors to record and evaluate environmental data, and employing various kinds of actuators to respond to user and environmental inputs.

The Physical Computing and the Internet of Things certificate is ideal for entrepreneurs developing products and services, artists wishing to create interactive installations, educators developing STEM activities for use in the classroom, small business owners working to improve business processes, hobbyists and makers and inventors, and anyone interested in enhancing job skills and solving real-world problems.

Catalog Date: June 1, 2020

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
MAKR 100	Introduction to Microcontrollers and Physical Computing	3
MAKR 101	The Internet of Things	3
Total Units:		6

Student Learning Outcomes

Upon completion of this program, the student will be able to:

- evaluate physical computing and Internet of Things products, services and devices, and choose appropriate technologies for a given application.
- design and develop physical computing and Internet of Things solutions using the principles of design thinking.
- utilize software, microcontrollers, and related electronic components to create interactive objects, prototypes and devices that integrate programming, networking, sensing, and actuation and respond to environmental and user inputs.

Modern Making (MAKR) Courses

MAKR 100 Introduction to Microcontrollers and Physical Computing

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Catalog Date:	June 1, 2020

Physical computing is a term for interactive physical systems that combine software and hardware to sense and respond to the analog world. In this hands-on course, students will learn to employ design thinking to create solutions that satisfy design requirements, and combine programming, microcontrollers, sensors, and output devices to develop conceptual and functional physical computing prototypes.

This course is designed for makers, artists and inventors, entrepreneurs, educators, hobbyists, and anyone interested in solving problems, developing or enhancing products, improving business processes, gaining additional job skills, or creating interactive art. No prior experience with programming or microcontrollers required. Students will need access to an Arduino microcontroller starter kit.

Student Learning Outcomes

Upon completion of this course, the student will be able to:

- design and prototype physical computing solutions using the principles of design thinking.

- evaluate and choose appropriate physical computing technologies to meet project requirements.
- utilize software, microcontrollers, and related electronic components to create prototypes and devices that respond to environmental and user inputs.

MAKR 101 The Internet of Things

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Catalog Date:	June 1, 2020

The course is an introduction to the concepts and technologies that enable the Internet of Things (IoT), including software, microcontrollers, network technologies, sensors and actuators. In this hands-on course, students will be introduced to the history and evolution of IoT, analyze and evaluate a variety of IoT systems and devices used in manufacturing, environmental monitoring, home automation, medical devices, and consumer products, and use design thinking and hardware and software skills to design, build, and test a simple IoT prototype.

This course is designed for makers, artists and inventors, entrepreneurs, educators, hobbyists, and anyone interested in enhancing job skills, solving problems, developing or improving products and business processes, or creating interactive art. No prior experience with programming or microcontrollers required. Students will need access to an Arduino microcontroller starter kit.

Student Learning Outcomes

Upon completion of this course, the student will be able to:

- evaluate Internet of Things (IoT) products and devices in everyday settings, and analyze the implications for privacy, security, and autonomy.
- apply design thinking and principles of interface design to develop an IoT prototype.
- create interactive objects that integrate programming, microcontrollers, networking, sensing, and actuation.

MAKR 110 3D Design for Additive Manufacturing

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Catalog Date:	June 1, 2020

In this hands-on course, students will design and fabricate 3D objects using computer-aided design (CAD) software and 3D printers. They will participate in the design process and become familiar with the advantages and limitations of each 3D printing technology in terms of precision, resolution, and material capabilities. Students will employ design thinking to create solutions that satisfy design requirements, and apply 3D printing technology to develop conceptual and functional prototypes. Designed for students with no prior experience with 3D printing or design.

Student Learning Outcomes

Upon completion of this course, the student will be able to:

- evaluate various 3D printing technologies and materials and choose the appropriate technology for a given application.
- design and develop solutions and prototypes using the principles of design thinking.
- utilize software tools to create, modify and prepare three dimensional models for printing.
- produce objects using a 3D printer.

MAKR 111 Digital Fabrication

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Catalog Date:	June 1, 2020

In this hands-on course, students will design and fabricate objects using computer-aided design (CAD) software and a variety of digital fabrication tools and technologies, including 3D printing (3DP), laser cutting, and Computer Numerical Control (CNC) milling, while employing design thinking to create conceptual and functional prototypes that satisfy project requirements.

This course is designed for makers, artists and inventors, entrepreneurs, educators, hobbyists, and anyone interested in enhancing job skills, solving problems, developing or improving products and business processes, or creating works of art. No prior experience with digital fabrication required.

Student Learning Outcomes

Upon completion of this course, the student will be able to:

- evaluate various digital fabrication technologies and materials and choose the appropriate technology for a given application.
- design and develop solutions and prototypes using the principles of design thinking.
- utilize software tools to create, modify and prepare two-dimensional and three-dimensional files for fabrication.
- produce objects using a 3D printer, a laser cutter/engraver, and a Computer Numerical Control (CNC) mill.

MAKR 290 Modern Making Capstone Project

Units: 1
Hours: 18 hours LEC
Prerequisite: MAKR 100, 101, 110, and 111 with grades of "C" or better
Catalog Date: June 1, 2020

The capstone project is an opportunity for students to demonstrate applied interdisciplinary skills, creativity, problem solving, and design thinking in the development of an in-depth making project. Working with faculty, students will create a project plan and develop a work product using skills, technologies and techniques of making. Students may choose to extend a prototype developed as part of a MAKR class, or address an identified challenge or need from the perspective of a specific discipline. Successful projects integrate modern making skills and techniques, and embody an awareness of a variety of constraints, including economic factors, user experience, safety, reliability, resources, market needs, aesthetics, ethics, and social impact. Students will have the opportunity to present their work as part of spotlight and showcase events. Students are required to supply materials and supplies to complete their projects.

Student Learning Outcomes

Upon completion of this course, the student will be able to:

- use the principles of design thinking to design and develop a comprehensive project.
- evaluate various modern making technologies, techniques, and materials and select the appropriate approach or combination of approaches to create a comprehensive project.
- produce and present a comprehensive modern making project.

MAKR 295 Independent Studies in Modern Making

Units: 1 - 3
Hours: 54 - 162 hours LAB
Prerequisite: None.
Catalog Date: June 1, 2020

MAKR 299 Experimental Offering in Modern Making

Units: 0.5 - 4
Prerequisite: None.
Catalog Date: June 1, 2020

Faculty

Zack Dowell

Instructional Design and Development Coordinator

Office: FLC Main, Aspen Hall, FL1-130
Email: dowellz@flc.losrios.edu (<mailto:dowellz@flc.losrios.edu>)
Phone: (916) 608-6605
Web: [Zack Dowell's Profile Page \(/about-us/contact-us/faculty-and-staff-directory/zack-dowell\)](#)

Emma Fletcher

Adjunct Professor

Office: FLC Main
Email: fletche@flc.losrios.edu (<mailto:fletche@flc.losrios.edu>)
Web: [Emma Fletcher's Profile Page \(/about-us/contact-us/faculty-and-staff-directory/emma-fletcher\)](#)

Rob Huddleston

Adjunct Professor

Office: FLC Main
Email: huddles@flc.losrios.edu (<mailto:huddles@flc.losrios.edu>)
Web: [Rob Huddleston's Profile Page \(/about-us/contact-us/faculty-and-staff-directory/rob-huddleston\)](#)

Makerspace

Check out FLC's state-of-the-art on-campus makerspace for student, faculty, and staff use - the Innovation Center!

VISIT MAKERSPACE ➤ ([/ABOUT-US/OUR-FACILITIES/INNOVATION-CENTER-MAKERSPACE](#))

Science, Technology, Engineering, and Mathematics

([/academics/meta-majors](#))

This program is part of the Science, Technology, Engineering, and Mathematics meta-major.

LEARN MORE ➤ ([/ACADEMICS/META-MAJORS](#))