

Ravenswood Middle School Makerspace Proposed CTE Elective COURSE DESCRIPTION

Three-semester career and self-exploration sequence of courses for 6-8th grade Makerspace CTE Elective.

NOTES: Originally drafted as part of application for RCSD's CA Middle School Foundation Academies grant in February 2019. See draft of day-to-day curriculum being tested in 2018-2019 in RMS + Chavez Makerspace Middle School Curriculum Tracking 2018-19.gsheat

The Ravenswood City School District Middle School runs on a trimester system, with 6-8th graders enrolled in one elective four times a week. The Makerspace or Design Technology department currently hosts general "taster" makerspace electives that incorporate short template and longer design thinking driven explorations into computer science, arts & crafts (including wood working), 2D and 3D design, and digital fabrication.

Our three trimester CTE career and self-exploration sequence of Makerspace electives would progress from:

- (a) 6th grade "taster" mini CTE focused career exploration course, where small, hands-on, technical skill building projects will be tied to defining both the tools and the career pathways including Information & Communication Technologies, Arts Media & Entertainment, Engineering & Architecture, Manufacturing & Product Development, and Building & Construction Trades (All Pathways Offered At our High School District, Sequoia Union HSD). Students will explore a variety of tools through short template projects such as cardboard engineering prototyping of hot glue gun stands, paper circuit popup cards, MakeCode coding for physical computing with Micro:Bit games and toys such as a Magic 8 Ball hack, and designing and carving a CNC based wood or HDPE wall tile.
 - Learning objectives for this starter course will center on some of the knowledge and performance anchor standards built on the Standards for Career Ready Practice and are common across the all the SUHSD industry sector academies, including
 - 3: Career Planning and Management,
 - 5: Problem Solving and Critical Thinking,
 - 9: Leadership and Teamwork and
 - 11: Demonstration and Application.
 - It will lay the foundations for digital literacy and safety in Makerspace classrooms (precursor to "shops" and labs at the high school level).

Alignment to Information and Communication Technology Industry Sector:

- Computer programming
- Computer sciences

- Game production
- Multimedia production
- Robotics

Possible CALPADS code:

8100 Introduction to Information and Communication Technologies

(b) 7th grade CTE Elective focused on further skills building in 3 core pathways Information & Communication Technologies, Engineering & Architecture, Manufacturing & Product Development. This course will involve 3 major assignments such as designing a vinyl cut logo sticker, designing a 3D character then printing, and learning 2D vector design software for laser cutting or CNC milling signs and awards.

- Two versions of this course could be taught from different instructional approaches including:
 - (1) the first aligned more to building design and art skills such as composition, drawing, and crafting;
 - Or (2) the second geared more towards an engineer's design cycle structure, with a focus on empathy, design thinking, and user centered design.
- Learning objectives for this second course will introduce the students to three main pathways: Information and Communication Technologies, Engineering and Architecture, and Manufacturing and Product Development. Through deeper explorations and self-driven project planning, students will focus on the Standards for Career Ready Practice including:
 - 4. Apply technology to enhance productivity.
 - 5. Utilize critical thinking to make sense of problems and persevere in solving them.
 - 10. Demonstrate creativity and innovation

Alignment to Information and Communication Technology Industry Sector:

- Computer programming
- Computer sciences
- Game production
- Multimedia production
- Robotics

Possible CALPADS code: 4607 3D Media Design 1

(c) 8th grade CTE elective course will be specialized in coding and physical computing, 2D design for printing, carving & fabrication, and 3D design & fabrication for engineering. Students will spend first third mastering one software and tool through personal "gift" projects, then complete a group design challenge, then finally propose, plan and implement a "genius project" and makerspace project portfolio for high school applications.

Learning objectives for these focused third intermediate courses will focus on the ICT pathway of Software and Systems Development and Games and Simulation, specifically:

- C3.0 Create effective interfaces between humans and technology
- C4.0 Develop software using programming languages.
- C5.0 Test, debug, and improve software development work.
- C6.0 Integrate a variety of media into development projects
- D2.0 Demonstrate an understanding of game and simulation analysis, design, standard documentation, and development tools.
- D3.0 Create a working game or simulation individually or as part of a team.
- D4.0 Identify, describe, and implement standard game/simulation strategy and rules of play.
- D5.0 Integrate music, sound, art, and animation as it applies to the environmental design of the game/simulation.

Or the course will also explore Engineering and Architecture Standards in the Engineering Design Pathway, including:

- C2.0 Understand the effective use of engineering design equipment.
- C3.0 Understand the sketching process used in concept development.
- C4.0 Understand measurement systems as they apply to engineering design.
- C11.0 Understand the methods of creating both written and digital portfolios.

Finally, this level of course will push students further in Manufacturing and Product Development Standards, specifically the Graphic Production Technologies and Machining and Forming Technologies Pathway, including:

- A1.0 Apply the basic graphic design principles to achieve effective visual communication.
- A4.0 Demonstrate technical illustration and vector drawing skills.
- B1.0 Validate that a provided part meets specifications from its engineering drawing by comparing specifications (geometric dimensioning and tolerancing) and by demonstrating proper technique using appropriate precision measuring tools.
- B10.0 Produce parts to specifications or drawings provided on a computer numerical controlled (CNC) mill or lathe.

Alignment to Information and Communication Technology Industry Sector:

- Computer programming
- Computer sciences
- Multimedia production
- Game production
- Social and New Media Production and Management

Possible CALPADS code: 8140 Introduction to Games and Simulation