Mason-Lake Tech Prep

Advanced Manufacturing Alignment to Visual, Performing and Applied Arts

Strand 1	Create (C)		
Applied Arts Standard	**How the Standard is Addressed in this Program**	**How the Standard is Assessed**	**Time Spent on the Standard**
C.1 Engage in full iterative cycles of artistic/creative process by problem seeking, exploring, making analytical, application, aesthetic, and design choices, before completion.	Early in the year students are given specifications for a job. Students learn problem-solving, making analytical and application decisions while meeting these job specifications. Later in the year, students have assimilated the skills and have the knowledge to create (or recreate) projects based on their individuality. Students go through the 5-step process for project design:1) identify the problem, 2) hypothesize / brainstorm possible solutions, 3) eliminate extraneous concepts, 4) make a proto-type, 5) develop a working drawing.	Students demonstrate proficiency on in-class projects, group projects, and lab competencies.	Concepts are encountered at various times throughout the year
C.2 Develop an idea, question, or problem that is guided by the personal, historical, contemporary, cultural, environmental, and/or economic contexts of the visual, performing, or applied arts discipline.	Students are required to create a project of their own choice. In this process, students develop their own idea and/or problem. In this decision-making process, they are guided by their personal preference for a design. Their personal preference is often influenced by contemporary, cultural, or environmental issues the students encounter. Economically, students need to factor in the time needed for their design project as well as the cost of different materials and tooling costs. The benefit of the advanced manufacturing class is the opportunity for students to design their project in CAD and then fabricating the actual product in manufacturing lab.	Students demonstrate proficiency on in-class projects and students are encouraged to participate in the MITES competition.	Concepts are encountered at various times throughout the year; primary focus during the second semester

C.3 Understand, recognize and use the elements, organizational principles, patterns, relationships, techniques, skills, and applications of the visual, performing, or applied arts discipline.	Students are to understand and use drafting standards to present and communicate objects, parts, ideas, and designs; such as when creating orthographic drawings and developing view placement for projection of the views. Students will create orthographics and isometrics in sketching and CAD applications. Students are expected to have the skills necessary to operate the machinery, the techniques and organizational skills necessary to follow appropriate steps to complete the project, and the ability to meet the evaluation process. (Evaluation criteria includes: does it meet the specifications, does it function properly, is it aesthetically pleasing?)	Students demonstrate proficiency on: 1) worksheets, 2) tests, 3) in-class projects, 4) final exam.	Concepts are encountered at various times throughout the year
C.4 Use the best available and appropriate instruments, resources, tools, and technologies to facilitate critical decision-making, problem solving, editing, and the creation of solutions.	Students continuously solve problems, create solutions, and revise their projects using technology typical to the mechanical design field. Traditional sketching skills are emphasized throughout the course of the year. Students will use desktop computers with the latest state-of-the-art SolidWorks software to create their own 2-D and 3-D designs. Additional hardware tools used by the students include a 42" color plotter, engineering copier, scanner, laser printer, overhead projector, and rapid proto-typer. In addition to the CAD software, the students also use and Internet Browser for the purpose of research as well as Mircosoft Word for the purpose of writing reports. Students will use MasterCAM as a CNC programming software to create code for use on a CNC controlled plasma cutter and vertical milling center.	Students demonstrate proficiency on: 1) worksheets, 2) tests, 3) in-class projects, 4) final exam, 5) presentations to the class, 6) written reports.	Concepts are encountered at various times throughout the year
C.5 Reflect on and articulate the steps and various relationships of the artistic/creative process.	The steps of the creative process in mechanical design include: 1. identify the problem 2. hypothesize / brainstorm possible solutions 3. eliminate extraneous concepts 4. make a proto-type 5. develop a working drawing. Throughout each of the phases in this in 5-step process, which is an iterative cycle itself, students are required to submit successive revisions of their individual projects.	Students demonstrate proficiency on: 1) quizzes / tests, 2) in-class projects, 3) group projects.	Concepts are encountered at various times throughout the year

Strand 2	Perform/Present (P)		
P.1 Apply the techniques, elements, principles, intellectual methods, concepts, and functions of the visual, performing, or applied arts discipline to communicate ideas, emotions, experiences, address opportunities to improve daily life, and solve problems with insight, reason, and competence.	Drawings communicate ideas formed through the use of mechanical elements and principles. Professional methods and techniques are utilized to achieve competent solutions to design problems. In the manufacturing of the product, needs of an audience are met. (For example, some projects are created because they can no longer be purchased but they are still needed. In other cases, some projects are created for aesthetic purposes. Whether for form or function, the production of these items improve daily life.)	Students demonstrate proficiency on: 1) in-class projects, 2) final exam, 3) group projects.	Concepts are encountered at various times throughout the year
P.2 Demonstrate skill use of appropriate vocabularies, tools, instruments, and technologies of the visual, performing, or applied arts discipline.	A complete set of mechanical drawings is designed and produced by each student through the use of sketching or CAD. The students need to be able to identify many tools and measuring devices necessary for the construction of their projects. They will be able to identify, determine, and demonstrate the safe us of the machines and equipment available for the construction of their projects. Students know specific nomenclature and acronyms unique to the disciplines of manufacturing.	Students demonstrate proficiency on: 1) in-class projects, 2) final exam, 3) group projects.	Concepts are encountered at various times throughout the year
P.3 Describe and consider relationships among the intent of the student/artist, the results of the artistic/creative process, and a variety of potential audiences or users.	Students are expected to satisfy the needs of their audience (end users of the products and fabricators that work in conjunction with designers to produce the end result) while concurrently maintaining the integrity of the design requirements. (e.g. Students need to consider the following: standardized design practices, form, fit, function, and ANSI or ISO Standards.)	Students demonstrate proficiency on: 1) in-class projects, 2) quizzes, 3) group projects	Concepts are encountered at various times throughout the year
P.4 Perform, present, exhibit, publish, or demonstrate the results of the artistic/creative process for an audience.	Students present and exhibit the results of their work at various student competitions such as MITES and the Rube Goldberg. Students can also display their work at the annual awards assembly, the 8th grade visitation, and the 10th grade visitation. Selected student projects are displayed in the showcase at the front Tech Center atrium.	Students demonstrate proficiency on in-class projects and/or group projects.	Concepts are encountered at various times throughout the year

Strand 3	Respond (R)		
R.1 Observe, describe, reflect, analyze, and interpret works of the visual, performing, or applied arts.	During the development of a project, students are given opportunities to interact and provide feedback to each other on how to implement design choices using other methods and/or techniques. Second year students act as a resource/mentor to first year students and assist them in analyzing their design choices. Students will look at professional drawings of complex parts including examples in textbooks and incorporate standard methods in projects.	Students demonstrate proficiency on in-class projects and/or group projects.	Concepts are encountered at various times throughout the year
R.2 Identify, describe, and analyze connections across the visual, performing, and applied arts disciplines, and other academic disciplines.	Students use a variety of geometry-based applications in the process of meeting their design requirements. Basic math and algebra skills are necessary for unit conversion, design interpretation, tolerancing, and process control. Students use English language arts for their technology report and career research paper.	Students demonstrate proficiency on: 1) worksheets, 2) tests, 3) in-class projects, 4) group projects, 5) reports/research papers.	Concepts are encountered at various times throughout the year
R.3 Describe, analyze, and understand the visual, performing, or applied arts in historical, contemporary, social, cultural, environmental, and/or economic contexts.	Students understand the changed role of a designer across time; the advent of technology has improved the quality and speed of design techniques. Designers no longer rely simply on traditional drafting equipment (drafting boards, triangles, etc.). As a result of the increase in technology, the improved precision and increased productivity of design products influence the economy and society. The technology has led to increased complexity of designs. (e.g. Students become aware that Advanced Manufacturing provides the tools necessary for societal changes in programs such as space exploration, nanotechnology, "green" technology, etc.)	Students demonstrate proficiency on: 1) in-class projects, 2) reports / research papers, 3) in-class discussions.	Concepts are encountered at various times throughout the year
R.4 Experience, analyze, and reflect on the variety of meanings that can be derived from the results of the artistic/creative process.	Students are frequently exposed to the concept that countless potential solutions exist for any given problem. The artistic/creative process as it is used in mechanical design may allow students to explore multiple possible design solutions to any one given problem. Groups of students will each be given a task to complete. Students will analyze each other's products of the task and determine which product best fits the design criteria (form, function, and process).	Students demonstrate proficiency on: 1) in-class discussions, 2) group projects, 3) researched elements of design criteria.	Concepts are encountered at various times throughout the year