Docket Item:


Summary:

Chemeketa Community College proposes a new Certificate of Completion in Computer-Aided Manufacturing (CAM) Fundamentals. Higher Education Coordinating Commission (HECC) staff completed a review of the proposed program. After analysis, HECC staff recommends approval of the degree as proposed.

Staff Recommendation:

The HECC recommends the adoption of the following resolution:
RESOLVED, that the Higher Education Coordinating Commission approve the following degree: CC0 in Computer-Aided Manufacturing (CAM) Fundamentals.
Chemeketa Community College seeks the Oregon Higher Education Coordinating Commission’s approval to offer an instructional program leading to a Certificate of Completion in Computer-Aided Manufacturing (CAM) Fundamentals.

Program Summary

The CAM Fundamentals certificate offers training in the knowledge and skills used by employees in manufacturing and related occupations. The certificate includes courses in manufacturing materials, interpretation of engineering drawings, measuring practices, layout work, and basic set-up and operation of computer controlled mills and lathes. This certificate may qualify graduates for an entry position in a variety of manufacturing-related jobs.

1. **Describe the need for this program by providing clear evidence.**

   At the October 17, 2018 Advisory Committee, members expressed a pressing need for shorter-term training for less specialized skills. A vote was taken and was passed by the Advisory Committee on April 24, 2019.

   It is projected that jobs will increase 23.9% in the Mid-Valley region including a 12.7% increase in jobs statewide between 2017-2027 with 25 annual job openings in the Mid-Valley region and 259 annual job openings statewide. Average wages (2018) in the Mid-Valley region was $39,323/year with starting wages averaging at $27,040. Statewide there were approximately 50 job openings on December 28, 2018. The state predicts that job growth will grow at the statewide average between now and 2027.

   The Bureau of Labor Statistics (bls.gov) shows a location quotient of 1.10 statewide. “The location quotient is the ration of the area concentration of occupational employment to the national average concentration. A location quotient greater than one indicates the occupation has a higher share of employment than the average. . . .”

2. **Does the community college utilize systemic methods for meaningful and ongoing involvement of the appropriate constituencies?**

   The college uses a range of sources to establish ongoing partnerships with its community constituencies. Some of these partnerships include: Northwest Commission on Colleges and Universities, the State Board of Education, Community College Workforce Development, employment advisory boards, student placement organizations, and licensing boards for appropriate occupations.
The Computer-Aided Manufacturing (CAM) Fundamentals was approved on February 11, 2019 by the Chemeketa Community College’s Curriculum Committee and then approved by Chemeketa Community College’s Board of Education on March 20, 2019.

Chemeketa Community College has partnerships with local high schools to offer courses in their schools for college credit. These courses will prepare students for entry into the program soon after graduating. Other required and general education courses will be valuable in preparation for entrance into the program and the workforce.

Collaboration with workforce and economic development partners assists the college to build a skilled and trained workforce ready to enter their fields immediately upon completion of the program. The Machining Technology department that will be offering this Computer-Aided Manufacturing (CAM) Fundamentals Certificate of Completion has an advisory committee composed of professionals from across the Willamette Valley:

- Kaleb Domeyer—DW Fritz Automation
- John Benjamin—SECO Tools Inc
- Rob Burns—River City Machine
- Jeremiah Davis—A-Dec
- Andreas Grob—SECO Tools
- Doug Harbord—DMG Mori
- Travis Jones—Innovative Manufacturing and Design
- Mike Keyser—Hill Brothers Machine
- David Marsh—DMG Mori
- Brian Mead—Allied Systems
- Dan Ulven—Ulven Companies
- Mike Ulven—Ulven Companies
- Steve Witmer—DMG Mori

3. Is the community college program aligned with appropriate education, workforce development, and economic development programs?

The courses for this program have been approved by the advisory committee so that students are fully prepared for the workforce. The program courses are:

- CAM100: Blueprint Reading and Sketching (2)
- CAM105: Precision Measurement (2)
- CAM115: Geometric Dimensioning/Tolerancing (2)
- CAM130: CNC Machine Setup Operation (4)
These courses were approved by the advisory committee on October 17, 2018.

Chemeketa’s Computer-Aided Manufacturing (CAM) Fundamentals program will lead to employable skills at the end of the program. Individuals in this field earn an annual wage of $39,223 per year and starting wages at $27,040 (qualityinfo.org), therefore it will allow these students to enter the workforce in a family-wage career.

4. Does the community college program lead to student achievement of academic and technical knowledge, skills, and related proficiencies?

The design of the program is a 44 credit hour approved Certificate of Completion. The primary audience for this program are students who wish to focus on machining fundamentals. The learner outcomes for each course provide a range of skills to allow graduates to pursue employment in this industry:

CAM100: Blueprint Reading and Sketching (2)
- Identify lines and views by their positions on the drawing.
- Explain three-dimensional representation (pictorial views) and apply them to orthographic drawings.
- Apply sketching skills to projects.
- Apply of sectional and auxiliary views in sketching
- Describe the application of assembly drawings.
- Interpret various specifications and callouts pertaining to machining operations.
- Explain and carryout geometric construction practices.
- Practice industrial accepted positive work ethics and habits to include teamwork, honesty, responsibility, punctuality, attendance, personal appearance, cooperation, positive attitude, and effective interaction skills.

CAM105: Precision Management (2)
- Compare the main differences between English and metric systems of measurement.
- Use basic English and metric measurement terms and equipment and perform the accepted care, handling storage and cleaning of measuring instruments.
- Use English and metric measurements and perform the accepted care, handling, storage, and cleaning of measuring instruments.
  - Collect Statistical Process Control (SPC) data.
  - Conduct set-ups for inspecting part surfaces.
• Identify the basic use and application of the Coordinate Measuring Machine.
• Practice standard industry work ethics and habits to include teamwork, honesty, responsibility, punctuality, attendance, personal appearance, cooperation, positive attitude and effective interaction skills.

CAM115: Geometric Dimensioning/Tolerancing (2)
• Interpret geometric dimensioning and tolerancing symbols.
• Specify geometric tolerancing required to meet form and function.
• Design gages for inspection of parts.
• Apply geometric tolerancing to drawings of parts.
• Practice standard industry work ethics and habits to include teamwork, honesty, responsibility, punctuality, attendance, personal appearance, cooperation, positive attitude and effective interaction skills.

CAM130: CNC Machine Setup/Operation (4)
• Identify machine construction and control systems.
• Identify basic program format structures for different CNC systems.
• Apply CNC operating systems in the manufacturing environment.
• Demonstrate the use of tooling on CNC machines.
• Setup and operate CNC mills and lathes.
• Identify and apply safety guidelines for running CNC machines.
• Input and retrieve CNC data.
• Demonstrate industrial accepted positive work ethics and habits to include teamwork, honesty, responsibility, punctuality, attendance, personal appearance, cooperation, positive attitude and effective interaction skills.

CAM140: Metallurgy for Manufacturing (2)
• Identify various steel-making and forming processes.
• Classify metals using a numerical system.
• Define and describe the mechanical and physical properties of metals.
• Perform Brinel and Rockwell hardness tests.
• Describe the alloying elements commonly used in steel production and their impact on machinability.
• Explain Phase Diagrams and the Iron-Carbon Diagram used in manufacturing.

CAM150: Cutting Tools and Materials (3)
• Determine metal selection based on product requirements.
• Select and apply cutting tool materials based on application.
• Determine tool coatings for optimum economics and performance.
• Select plastic materials based on production specification.
• Determine cutting speed, feed rate and depth of cut based on selection and application of machine, tool and work-piece.
• Utilize previous knowledge and skills presented and practiced for CAD and CNC systems, measuring, inspection, quality control, and GDT.
• Practice standard industrial work ethics and habits to include teamwork, honesty, responsibility, punctuality, attendance, personal appearance, cooperation, positive attitude and effective interaction skills.
• Use standards of the Machinery's Handbook as applied to tooling and material selection.
CAM190: Intermediate CNC Lathe Operation and Programming (4)
- Develop process plans for successful program implementation.
- Use lathe program fundamentals.
- Apply basic lathe program format structure.
- Set up and operate CNC lathes.
- Select appropriate tooling for lathe programs.
- Calculate compensation and offset type for lathe programs.
- Apply efficient program techniques using canned cycles, subroutines, loops and macros.
- Demonstrate industrial accepted positive work ethics and habits to include teamwork, honesty, responsibility, punctuality, attendance, personal appearance, cooperation, positive attitude and effective interaction skills.

CAM280: Cooperative Work Experience (10 over three terms)
- Write, implement, complete, and evaluate learning objectives.
- Select and apply job skills from the specific curriculum to a work experience.
- Apply professional work habits on job site.

FE205B: Resumes and Job Search Correspondence (1)
- Develop and compose effective communication materials necessary for job search career management.

These courses lead to the following outcomes that students will be prepared to accomplish:

- Use effective communication skills as a team member.
- Apply basic and precision industry standard measurement practices.
- Set up and operate Computer Numerical Controlled (CNC) machine tools to produce accurately sized parts.
- Apply cutting speeds and feeds to materials used in machining and manufacturing.

Learning will be ensured through the assessment of these program outcomes with the following methods:

Tests, practical applications, and projects

Instruction methods within this program will be primarily face-to-face, to include internship experience throughout the certificate program. Students will have general education courses for the degree. Any general education courses may be provided in a face-to-face, a hybrid, or an online environment. Program course lectures provide various hands-on activities.

The college has a unit planning process that includes a program assessment on an annual basis. Student, faculty, advisory committee, and administrative collaboration is incorporated to ensure students are prepared with appropriate skills to enter the workforce and meet the requirements of industry.
5. **Does the community college identify and have the resources to develop, implement, and sustain the program?**

The Northwest Commission on Colleges and Universities (NWCCU) accredits Chemeketa Community College.

The new program will have startup costs of negligible impact (this replaces a current certificate and all courses are already offered).

Year 0: Total Revenue: $100,800 Total Expenditures: $98,928 Net Income (Deficit): $1,872

**Assurances**

Chemeketa Community College has met or will meet the four institutional assurances required for program application.

1. **Access.** The college and program will affirmatively provide access, accommodations, flexibility, and additional/supplemental services for special populations and protected classes of students.

2. **Continuous Improvement.** The college has assessment, evaluation, feedback, and continuous improvement processes or systems in place. For the proposed program, there will be opportunities for input from and concerning the instructor(s), students, employers, and other partners/stakeholders. Program need and labor market information will be periodically re-evaluated and changes will be requested as needed.

3. **Adverse impact and detrimental duplication.** The college will follow all current laws, rules, and procedures and has made good faith efforts to avoid or resolve adverse intersegmental and intrasegmental impact and detrimental duplication problems with other relevant programs or institutions.

4. **Program records maintenance and congruence.** The college acknowledges that the records concerning the program title, curriculum, CIP code, credit hours, etc. maintained by the Office are the official records and it is the college’s responsibility to keep their records aligned with those of the Office. The college will not make changes to the program without informing and/or receiving approval from the Office.