

**Docket Item:**

Community College Approval: Columbia Gorge Community College, Certificate of Completion in Advanced Manufacturing Technology, within 48.0511 Metal Fabricator.

**Summary:**

Columbia Gorge Community College proposes a new Certificate of Completion in Advanced Manufacturing Technology. 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: CCo in Advanced Manufacturing Technology.



**COLUMBIA GORGE**  
COMMUNITY COLLEGE

**Columbia Gorge Community College seeks the Oregon Higher Education Coordinating Commission's approval to offer an instructional program leading to a Certificate of Completion in Advanced Manufacturing Technology.**

### **Program Summary**

By adding in additional skills and learning, reflective of production using metals in the Columbia Gorge region, this manufacturing certificate seeks to build on the 16 credit Manufacturing certificate. Students in this program learn a broad range of skills including: the operation of welders and welding common joints to AWS standard; the safe operation of many tools used in modern manufacturing shops, including CNC equipment; practical fabrication of product and quality control; along with fitment and fixturing to reproduce product for sale. The program includes integrated math and science concepts that foster critical thinking and problem solving in the manufacturing environment and prepare students for the ever changing workplace of the modern world.

### **Student Learning Outcomes**

Students who successfully complete this degree will be able to:

1. Produce welds to AWS D1.2, 1.2 and 1.6 standard in fillet and grooves using GMAW, SMAW and GTAW processes.
2. Demonstrate knowledge of basic CNC operations and G Code.
3. Manufacture product from conceptualization to reality through research and development.
4. Use critical thinking and problem-solving skills to create more efficient systems of manufacturing.
5. Apply basic metallurgical concepts and basic materials science as they pertain to metals, creating better production results in manufacturing processes.
6. Demonstrate knowledge of necessary mathematical concepts as they apply to manufacturing.

### **Career opportunities**

Students completing the Advanced Manufacturing and Fabrication program can go a variety of directions with their training, including, but not limited to, metal fabricators and assemblers; cutting, punching and press machine operators; lathe and turning machine operators; welders, cutters, solderers and brazers; grinding and polishing workers; computer-controlled tool operators and programmers.

### **Alignment and articulation**

For the last five years, CGCC has aligned and articulated with The Dalles High School's welding program and Hood River Valley High School's metals program. The same 13 credit Manufacturing certificate

offered at CGCC was available for dual credit at the high schools. Now, as CGCC grows their program to more advanced learning and training, the college will continue to work with the high schools to articulate the foundational skills and allow high school students to earn dual credits that will transfer to CGCC's program.

How the program "fits" within a career pathway design.

The Advanced Manufacturing certificate is designed to be a career pathway certificate (43 credits) that will eventually lead to a two-year AAS when the second year of the program is developed in 2020-21.

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

The Advanced Manufacturing Technology certificate will train students for employment in the welding, fabrication and design fields using a production manufacturing environment. Career opportunities include repair welding, production welding, cutting parts, blueprint reading and fitting, tacking, fabrication, polishing and operation of CNC equipment.

In Oregon, welders, solderers and brazers work in many types of industries but a majority are concentrated in manufacturing. While there are many areas of metals based manufacturing in Oregon, this program prepares students for employment in structural metal fabrication specifically assembly and fabrication; grinding lapping polishing and buffing machine tenders and operators; lathe and turning machine tool setters; hand grinding and polishing workers; computer numerically controlled tool operators sub categories. In the gorge most of these jobs fall under Welders, Cutters, Solderers, and Brazers, a sector employing 5,120 people in 2019. In the next 10 years, growth in this industry is expected to be 12.4% statewide and 7% in the Columbia Gorge, including replacement employment. Compared to nationwide growth of 3%, this growth is faster locally and statewide, as well as faster than average of all occupations indexed. Nationwide 438,900 people are employed as welders, cutters, solderers and brazers.

The expected employment gap including replacement is estimated at 2,001 state wide, 1,342 for assemblers and fitters and 659 for welders, solderers and brazers. Locally, annual openings are estimated at 25; 18 assemblers and fitters and 7 welders, solderers and brazers.

Because these skills are in demand in a wide array of occupations, it is difficult to capture in a discrete data set the different job descriptions that students may be able fill after completing this program. Since this certificate offers broad scale training to prepare students for entry into the work force instead of the narrower, more specific training that many programs focus on, it can be expected that the above numbers would be minimums. The numbers above also do not capture the computer-based skillsets and hybrid machining skillsets that are included in the certificate. Therefore, certificate has the potential to develop a more well-rounded employee who may easily be trained further to fit

specific machines and needs of business; however, it is difficult to predict the employment potential using defined data sets.

Using a broader set of data from the Bureau of Labor Statistics, wage outcomes are anticipated to be from \$34,000 to \$62,000 within production based occupations under code 51. Using the specific data outcomes listed above, wage outcomes can be expected to be somewhere between \$36,000 and \$52,000 in the Columbia River Gorge, slightly higher than the statewide expected wage outcomes of \$37,000 to \$49,000.

This program seeks to meet the needs of local employers and throughout the broader central Oregon region for a more well-rounded employee. Many employers have expressed interest in a worker they would be willing to fine tune to their production facility in terms of welding operations, but would rather have an employee with science and math knowledge, skills in fitment, and in the modern technology that has become a key and integrated part of their operations. Mixing CNC and many other processes into a product focused fabrication course-set allows students to capitalize on skillsets normally only taught in much higher level engineering training programs. As a result, there is a lower cost utilization rate for the employer and a higher potential wage for the employee compared to other certificate and AAS programs. By including this broad range of skills, completion of this certificate gives a competitive advantage to graduates of the program when entering the workforce.

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

CGCC currently offers a less-than-one-year certificate that was developed in cooperation with numerous local industry partners. Since that time, and as the program has grown, information and advice has been continually gathered to change and tweak program outcomes and student learning. That process involved many industry partners as well as several advisory committees and has resulted in the creation of this expanded manufacturing certificate.

External collaboration was carried out through ongoing interactions between program faculty/developers and CGCC's STEM Advisory Committee and Electro-Mechanical Technology Advisory Committee, the high Dessert ESD Program of Study group, and the local STEM Hub. These groups include industry partners that provide expertise on local and regional manufacturing industry systems and processes, as well as identification of necessary skillsets to be addressed in the program. In addition, current CGCC manufacturing faculty have experience in the field and own and operate their own successful businesses.

One major focus of this program is to work closely with the local STEM hub in creating a workforce and enrollment that is more reflective of overall student enrollment at CGCC. By breaking down the

traditional skillsets and casting a broader net, the hope is that some of the more technical and technology based skills will attract more females and underserved minorities to the program. With further STEM hub guidance and collaboration, as well as through grant work and outreach, it is thought that CGCC can progress in making this a reality.

Finally, program development has been conducted in collaboration with local high schools and their faculty in a desire to expand current relationships and increase job specific pathways for high school students. The current manufacturing certificate is already articulated at The Dalles High School, Riverbend Community School and Hood River Valley High School, and partnerships are being fostered at Stevenson, Dufur, and Columbia high schools. The new expanded certificate will provide greater opportunities for high school students.

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

CGCC is in a unique position to offer this program in a new Skills Center, and in a time when the field of manufacturing is rapidly changing. As local manufacturing becomes higher tech, and further blurs the line between a product-based and development-based emphasis, it is important that the employment needs of growing local businesses be met. The new Advanced Manufacturing Technology certificate, and to an ever greater degree, the anticipated AAS to be developed in 2021-22, will help the community be ready to meet this workforce need.

The set of skills being offered in this certificate are not traditionally offered in combination. As a result, articulation to existing programs at other colleges is limited. While elements of many programs, including those at COCC, PCC, BMCC and LBCC, are included, none of these programs offer anything quite as expansive within one certification.

However, the articulation at the secondary level is very promising, with two local high schools already on board and several others waiting in the wings or developing programs that will later be articulated. These articulations should provide an excellent source of future students for the program and help address the issues around rural-flight that often times plague the Columbia River Gorge when developing local talent. A career pathway with aligned outcomes and effective assessment can be clearly and easily founded in high schools throughout the Gorge.

In addition, the expansion of this program and “basic skills” taught in many of its classes offer alignment with MCED’s “Workforce Skills Basic Training” initiative. Many of the courses in this sequence provide ample opportunity for entry-level positions in a variety of fields, and, with the expansion of the certificate, higher wage entry-level positions are unlocked for graduates. Furthering that, many employees already employed but potentially “plateaued” in their current positions, may

see opportunity in retraining or taking courses through the program to learn the skills that they will need for advancement.

The certificates coursework is also part of the East Cascade Works latest grant initiative “Reimagine Workforce Preparation,” which includes a goal to help expand the program in Year Two. This expansion will further diversify the skillsets taught to better support workforce educational needs and retraining.

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

The Manufacturing certificate will offer students a concrete and sequential learning pathway, which will allow students to make the most of their credits and educational experience. Much like in math, many of the skills taught in the program, particularly the certification preparation segments, build upon each other in a way that may not be taken out of sequence. This allows for a very straightforward test out process for students who would like to advance or enter the program somewhere besides the beginning of the pathway.

Program curriculum has been developed to align with industry and certification standards. Training and testing in these courses follow accepted testing practices of the AWS, preparing students directly for certification testing in the same manner that they will be examined. Rigor is built-in because of the testing that is required to be successful. With tolerance and specific pass/no-pass approaches in place, as well as rubric-based grading, students are assessed as they would be in industry upon successful completion of a product for sale. If the product is not ready, incorrect, or out of specification, students will retake and retry until successful.

Courses are a mix of lecture/lab and provide significant hands-on/experiential learning. This real-life approach supports learning and the eventual transition to the workforce. It also has been shown to improve access and success for ELL/LEP and other often underrepresented students. As such, students who are not traditionally enrolled in courses such as these are targeted for enrollment through both curriculum design and environment.

Class scheduling has also been designed to work with the target clientele. By having night classes, workers currently employed may use the program for retraining purposes, and students in secondary education programs are still able to access the program even if full time in a traditional high school. This opens the doors to many who might not be able to fit in the traditional college student’s schedule. Program quality and design is assessed through CGCC’s cyclical 5-year Program Review process. Program Review includes assessment of trends in student achievement (student learning outcomes, certificate completion, and employability), review of courses (alignment with professional and national standards, currency and relevance) as well as current labor market information and employment

opportunities. Student and advisory committee feedback is integral in the review process.

5. ***Does the community college identify and have the resources to develop, implement, and sustain the program?***

CGCC has already made a very significant investment in growing its manufacturing program and courses through the building of the new Skills Center. For this year of implementation, existing equipment is sufficient and will be moved to the new Skills Center. Ongoing maintenance and a supplies budget are in place, but will scale with the additional classes and students that enroll in the program. Cost of materials may rise due to both economic uncertainty and the additional coursework using both aluminum and stainless steel; however, some partners provide support in terms of materials and old equipment, and that support is expected to continue moving forward. In addition, Perkins Grant dollars are available to assist in initial equipment purchase and professional development, and the college has numerous grants in the works to help offset or fully alleviate any additional start-up equipment costs. Finally, with additional space, larger class sizes may be accommodated, resulting in increased enrollment, tuition and FTE.

Current student to faculty ratio is 15:1, but an expansion to up to 25:1 is possible in the new lab. The need for additional adjunct faculty will be reviewed and considered as the program grows.

***Assurances***

Columbia Gorge 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 *intra*segmental 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.