

Docket Item:

Community College Approval: Chemeketa Community College, Certificate of Completion in Irrigation Technician within 01.0205 – Agricultural Mechanics and Equipment/Machine Technology/Technician.

Summary:

Chemeketa Community College proposes a new Certificate of Completion in Irrigation Technician. 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 Irrigation Technician.



Chemeketa Community College seeks the Oregon Higher Education Coordinating Commission's approval to offer an instructional program leading to a Certificate of Completion in Irrigation Technician.

Program Summary

The Irrigation Technician program will provide hands-on training and education in irrigation system design, operation, scheduling, and troubleshooting.

The Irrigation Certificate prepares students to enter the workforce as:

- Irrigation Designers
- Installation Foreman
- Service Technician
- Sales Personnel

After completing the Irrigation Certificate students will be prepared to pass the exam for either the Certified Agricultural Irrigation Specialist (Irrigation Association) or the Specification for Irrigation System: Installation and Maintenance Certification Programs (EPA WaterSense).

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

Located within Oregon's fertile Mid-Willamette Valley, Chemeketa Community College serves a 2,600 square-mile district of approximately 618,000 residents within three counties - Marion, Polk, and Yamhill. Known for its abundant natural resources, the Mid-Willamette Valley is Oregon's greatest producer of agricultural products. USDA Census of Horticulture Specialties (2014) ranks Oregon among the top 3 nursery producing states in the U.S., with 61,000 acres in nursery production. Sales of greenhouse and nursery products - Oregon's top agricultural commodity - reached approximately \$947,727,000 in 2017 (Oregon Department of Agriculture; Patterson, 2018); over 40% of the sales were generated within Chemeketa's service district. According to the U.S. Department of Agriculture (August, 2018), Marion County, where Chemeketa's main campus is located, ranks first out of 36 counties in the state for nursery and greenhouse products.

As the nation-wide demand for nursery products grows, the industry's labor shortage continues to persist (Bell, 2019). The 2017-2027 employment projections for Oregon's farmworkers and laborers, crop, nursery and greenhouse workers indicate growth by 12% for the state and 15.3% for the Mid-Willamette Valley (State of Oregon Employment Depart, 2019). Filling the industry's 1,622 annual job openings with qualified labor is a challenge. Surveys conducted by Nursery Management (November, 2018) show 51% of respondents reporting "insufficient availability of qualified labor in the market" as the cause for limited new hires in the past 12 months. Industry trends are reflected in the number of

students within Chemeketa's Horticulture program: During 2016-17 and 2017-18 the unduplicated headcount for the Horticulture program was 156 and 153 respectively when including College Credit Now and "community agriculture", e.g., nursery personnel receiving pesticide training. But when counting only credit bearing college students, most recent data from Institutional Research reveals the number of students graduating with an AAS in Horticulture, was only seven in 2015 and six in 2016. Enrollment is high, but graduation rates are low.

Besides facing shortages of qualified labor, the nursery industry also faces scarcity of water. Oregon's population grew 9.4% between 2010 and 2018 (U.S. Census Bureau). Seventy percent (70%) of the population live in the Willamette Basin, placing greater demands on the region's water supply. The increasing demand on water coupled with rising electricity and water costs necessitate a nursery workforce who are informed in nursery production systems and equipped to manage the state's scarce water supplies (Pacific Northwest Extension, July 2018). Nursery recruitees as well as mid-career employees looking to advance into mid-management will need to be well-versed in Oregon's irrigation and water conservation issues.

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 Irrigation Technician Certificate was approved on March 3, 2021 by the Chemeketa Community College's Curriculum Committee and then approved by Chemeketa Community College's Board of Education on April 21, 2021.

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 Agricultural Sciences & Technology department that will be offering this Irrigation Technician Certificate has an advisory committee composed of professionals from across the Willamette Valley:

See Advisory Committee.docx for list of Advisory Committee members

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:

- ELT100: Electronics Fundamentals for Non-Majors (3)
- HOR111: Introduction to Horticulture (3)
- HOR130: Irrigation Principles and Practices (3)
- HOR135: Irrigation Controllers and Instrumentation (4)
- HOR140 Irrigation Pump Applications (3)
- HOR145 Irrigation Design and Components (3)
- HOR150 Blueprint Reading and Sketching (2)
- HOR275: Innovative Water Strategies (2)
- HOR280E: Cooperative Work Experience (5)
- MT227A Pneumatics and Hydraulics Fundamentals (3)
- SOIL205 Soil Science (4 credits)

These courses were approved by the advisory committee on November 13, 2020.

Chemeketa's Irrigation Technician Certificate program will lead to employable skills at the end of the program. Individuals in this field earn an annual wage of \$34,079 per year and starting wages at \$12.52/hr (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 is students who wish to focus on developing technical skill and work readiness for irrigation topics in the Agriculture sector. The learner outcomes for each course provide a range of skills to allow graduates to pursue employment in this industry:

ELT100: Electronics Fundamentals for Non-Majors (3)

- Solve simple circuits using Ohm's Law.
- Operate a multimeter.
- Operate an oscilloscope and function generator.
- Be able to interpret resistor color codes.
- Identify common electronic circuits and devices.
- Complete course material and assign tasks in timely manner similar to the pace used in industry.
- Describe how motors and generators work.

- Use engineering notation.
- Solve simple series, parallel, and complex circuits.
- Construct simple circuits from schematics.
- Describe how common semiconductors work.
- Practice static control techniques.
- Practice safety concepts.

HOR111: Introduction to Horticulture (3)

- Identify key components of Oregon horticulture industry and associated job opportunities.
- Explain the requirements for plant growth.
- Describe the physical, chemical and biological components of soil and methods to modify them.
- Interpret fertilizer recommendations for various horticultural crops.
- Discuss the similarities and differences between organic and synthetic fertilizers.
- Describe the important factors in creating a healthy, productive greenhouse environment.
- Explain propagation methods commonly in use in Oregon horticulture industry.

HOR130: Irrigation Principles and Practices (3)

- Identify various irrigation methods and their system components.
- Understand the installation, operation, basic maintenance, and cost of different irrigation systems.
- Understand the principles of basic soil-water-plant relationships.
- Describe the impacts of water quality and supply on irrigation system selection operation, and efficiency.
- Analyze irrigation methods for best selection and efficiency.
- Design an irrigation schedule.

HOR135: Irrigation Controllers and Instrumentation (4)

- Install irrigation systems.
- Program irrigation systems to improve irrigation efficiency and conserve water resources.
- Operate different control systems.
- Integrate electrical and mechanical components.
- Troubleshoot and repair irrigation systems.

HOR140: Irrigation Pump Applications (3)

- Identify pump classes and types and piping materials and fittings.
- Select pumps based on piping system dynamics, process fluid density, and affinity laws.
- Perform pump maintenance exercises including naming components, replacing packing, and assembling pumps.
- Use and interpret pump and system curves.
- Evaluate net pressure suction head (NPSH) characteristics.
- Interpret NPSH criteria and apply to suction side design.
- Analyze series and parallel pumping applications.
- Assemble pipe sections together with appropriate fittings.

HOR145: Irrigation Designs and Components (3)

- Understand the different types of irrigation systems, their purpose, and application.

- Identify the components used in different irrigation systems.
- Understand how plant-soil-water relationships, plant water requirements, and watering schedules impact irrigation design.
- Design an irrigation system using the proper sprinkler heads and patterns, correct pipe size, zoning and layout, and appropriate valve types, wire sizes, fittings, and controllers.
- Explain industry standard installation methods for the different irrigation systems.

HOR150: Irrigation Blueprint Reading and Sketching (2)

- Utilize engineering and architectural scales to take measurements.
- Interpret and understand construction plan symbols and drawings.
- Utilize basic drafting technologies and conventions.
- Develop a site assessment and define the irrigation system needed.
- Construct an irrigation system in a readable format.

HOR275: Innovative Strategies for Water Quality Management in Nurseries (2)

- Trace a drop of water through the nursery from source to outlet.
- Describe conventional approaches to nursery/greenhouse water management.
- Summarize the regulations that apply to nursery water management.
- Evaluate the risks and benefits of working with re-circulated water or reclaimed wastewater.
- Compare/contrast the functions and infrastructure of different phytoremediation technologies.
- Illustrate ways in which phytotechnologies can enhance nursery production value.
- Design a water quality management plan for a nursery or greenhouse.

MT227A: Pneumatics and Hydraulics Fundamentals (3)

- Discuss the principles of pneumatic systems and how they are put to use in control and logic systems.
- Design, repair, test, assemble and troubleshoot pneumatic logic and control systems.

SOIL205: Soil Science (4)

- Discuss the various functions of soils in natural and managed ecosystems.
- Explain the five primary soil forming factors and the four basic processes of soil formation.
- Describe the major characteristics, the general degree of weathering and soil development, and the worldwide distribution and uses of the 12 soil orders.
- Understand the morphological, physical, and biological properties and processes of the soil.
- Apply soil science concepts to plant production and to everyday experiences.

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

- Distinguish between the different types of irrigation equipment and their applications.
- Design basic irrigation systems
- Install properly designed irrigation systems.
- Identify mechanical components of valves, center pivots and pumps.
- Analyze irrigation pumps and controls in relation to a complete irrigation system.
- Assess and design fish screens.
- Perform soil moisture measurements and water scheduling.
- Develop an understanding of water related cultural perspectives, views and opinions.
- Understand watershed processes and how they relate to the natural environment.
- Gain insight into water laws and policies in the PNW which affect the use and non-use of water.

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

- Quizzes
- Exams
- Article Summaries
- Field trip synopsis
- Lab notebooks
- Lab reports

Instruction methods within this program will be Face-to-face, lecture/lab, online and remote. Students will complete two applied mathematics 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 Irrigation Technology.

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 \$4,550.

Year 0: Total Revenue: 0 Total Expenditures: \$4,550 Net Income (Deficit): (\$4,550)

Year 1: Total Revenue: \$13,284 Total Expenditures: \$14,460 Net Income (Deficit): (\$1,176)

Year 2: Total Revenue: \$19,480 Total Expenditures: \$14,782 Net Income (Deficit): \$4,698

Year 3: Total Revenue: \$29,222 Total Expenditures: \$15,359 Net Income (Deficit): \$13,863

The Horticulture program has two full-time faculty positions and one full-time and one half-time classified staff along with numerous adjunct faculty who generally work full-time in the industry. The program has the flexibility to use general fund dollars to expand the adjunct workforce to teach additional courses in the degree and to offset full-time workload as needed.

Chemeketa Community College has begun programs over the last fifty years and has had the institutional support in hiring qualified and trained faculty to teach in all CTE programs.

This new program and its courses have been developed and approved by the employer-based advisory committee, as well as approved by the college's Curriculum Committee and Chemeketa Community College's Board of Education.

Faculty will regularly participate in professional development activities to stay current and up to-date with industry changes and requirements, which will translate into the classroom learning environment.

The program will reside at Salem campus.

The college has strong relationships with industry partners/employers and will continue to foster these relationships. This program has an employer-based advisory committee. The program will continue to work with local industry leaders and educational institutions to recruit students for this program.

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 *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.