KLAMATH
Community College

2021-22

Instructional Program Review

Manufacturing Engineering Technology

Stan Pence

CONTENTS

1. PROGRAM/DISCIPLINE MISSION/GOALS AND LINK TO STRATEGIC PLAN

1A. DESCRIBE PROGRESS TOWARD GOALS SET IN PREVIOUS REVIEW, ANNUAL BUDGET PRESENTATIONS, AND/OR STRATEGIC BUDGET PLANNING.

Goal 1 (Prosperity): Improve student success in workforce employability through certifications and resume/portfolio development opportunities

Measurable Target: Benchmark # of certifications measured. Academic year by academic year increase the number of certifications, goal five percent. Increase in the number of partnerships and affiliations at least one each year.

- Have majority of students pass third party certification for both CAD and CAM. Modify course work to ensure matching of local needs and certification for employment

Goal 2 (Access): The CAD / CAM Technology programs will seek to improve both the quantity and range of student populations enrolling at KCC.

Measurable Target: Benchmark the number of the present student population and those that are underrepresented and underserved in technology fields. Increase the number of nontraditional technical students. Increase the number of dual enrollment and dual credit students.

- Increase the number of traditional and non-traditional students in the program. Now primarily not traditional. Will spend effort of department personnel talking up to recruit college students from Universities and from K-12 on the opposite end.

Goal 3 (Excellence): The CAD / CAM Engineering Technology and CAD / CAM Technologist programs will enhance its reputation both locally and statewide through unique programs.

Measurable Target: Students will meet the needs of the articulating universities and hiring companies.

- Iterative modifications of instruction and process here at KCC to match articulating institutes and industry will occur yearly.

Goal 4 (Community): Programs will actively reach out to local business and organizations that have a need for CAD / CAM and manufacturing personnel for internships, partnerships, and agreements. Ensure relevant skills as required by the industry.

Measurable Target: Ten percent of students into the industrial setting and in reverse industrial at least one industry professionals into the college and guest lecturers and adjuncts to keep the study fresh and relevant.

- Go out early into work place to learn and bring back to the college what skills are needed and changes to industrial landscape.

Department Plan With Notes
Manufacturing

Mission Statement

The Computer Aided Design (CAD) / Computer Aided Manufacturing (CAM) department will promote success for students, local companies and regional companies by making ready to work technicians and engineering technicians available and ready to work and create. By partnering extensively with local

business and higher educational institutions for training, instructors, and potential employment opportunities, the Department will reach deeply into the community to foster a network of job opportunities and an available pool of highly trained CAD /CAM manufacturing and professional engineering technicians. The Department offers career tracks at multiple levels leading to a variety of careers in the design and manufacturing industry.

Goal	Goal Title	Initiative	Explanation
1	**Improve student success in workforce employability through certifications and resume/portfolio development opportunities**	Prosperity	Have majority of students pass third party certification for both CAD and CAM. Modify course work to ensure matching of local needs and certification for employment

Measurable Target

Benchmark # of certifications measured. Academic year by academic year increase the number of certifications, goal five percent. Increase in the number of partnerships and affiliations at least one each year.

Action Items

- Increase Third party certifications by agreements with Solidworks, AutoCAD, MasterCAM OEM's.

Progress Notes

Trained with Tom on this tool. (2/27/2019)

Have contacted NW Tech (third party certificate vendor company) about third party testing for students at the end of the instruction period. (5/17/2019)

Contacted both AutoCAD and Solidworks testing third party services and will have 2019 - 2020 students take both third-party exams when the final course is offered: AutoCAD last course Winter term and Solidworks final course is Spring. (12/6/2019)

We have scheduled both AutoCAD and Solidworks third party tests to be administered the first and second week of June following graduation. I have also contacted SME (Society of Manufacturing Engineers) to create a path for my students and apprenticeship students to take a preparatory and follow on class and test for SME verification evaluations for certified manufacturing associate General tooling and Tooling. The SME tests are aimed both at techs and engineers, ours obviously will be tech evaluations (4/29/2021)

Successes

(No Successes)

	Status		
	In Progress		
Goal	**Goal Title**	**Initiative**	**Explanation**
2	**The CAD / CAM Technology programs will seek to improve both the quantity and range of student populations enrolling at KCC.**	Access	Increase the number of traditional and non-traditional students in the program. Now primarily not traditional. Will spend effort of department personnel talking up to recruit college students from Universities and from K-12 on the opposite end.

Measurable Target

Benchmark the number of the present student population and those that are underrepresented and underserved in technology fields. Increase the number of nontraditional technical students. Increase the number of dual enrollment and dual credit students .

Action Items

- Grow dual enrollment and dual credit from High Schools
- "Grow fulfillment of state requirements for Program-of-Study
- Grow facilities and hardware in a variety of locations, both educational and industrial.
- Grow through outreach to all students, with emphasis on underrepresented students in technology fields

Progress Notes

Have had contacts with Henley engineering instructor starting a PoS to link to KCC. Contacts with Klamath County School District for dual credit and lead in programs for KCC studies (5/17/2019)

On-going talks with Klamath County Schools (Dr. Hillyer) and his technical staff to add CAD coursework at the high school level next Fall. Also, seeing our first home school, high school student in the program - we are making this program know in the local area and are starting to see first fruits. (12/6/2019)

We currently have three high school aged students in the program. One student attends both OIT and KCC. Our second machining course (numerical controlled programming) has two women of color in the class and my third machining course (computer numerical controlled programming) has our second young female that came out of a home school to begin last year – and I currently my T/A for both CAD and CAM. We also have two remote students for the Puget Sound area and another female student attending from Nampa, Idaho. PoS candidate (Dr. Kristi Lebkowsky – Henley S.H.) will finish her work with KCC this academic year (4/29/2021)

Successes

New PoS signed with Henley and SOESD for KCC / Henley engineering joint study program. (5/17/2019)

Status

In Progress

Goal	Goal Title	Initiative	Explanation
3	**The CAD / CAM Engineering Technology and CAD / CAM Technologist programs will enhance its reputation both locally and statewide through unique programs.**	Excellence	Iterative modifications of instruction and process here at KCC to match articulating institutes and industry will occur yearly.

Measurable Target

Students will need the needs of the articulating universities and hiring companies.

Action Items

- Increase articulation agreements with OIT and negotiate articulation agreements with SOU, Oregon State University, and the University of Oregon to a variety of pathways
- Create mentorship and real-world application study at industrial concerns
- Create study to work partnerships with local Original Equipment Manufacturers (OEM), leading to internship and employment.

Progress Notes

Articulation in place with OIT, mentorship program with three (3) OEM's for 5 students. (5/17/2019)

There have been significant changes to the CAD and CAM programs after our first students went to companies like Columbia River CAD and Jeld-Wen (J-W). Our CAD course work has had some weeks combined so that new material, that matches company needs could be added. In our machining program new hardware has allowed us to increase the types of programming the students can attempt. The new CNC profiler is a smaller version of the machines at J-W's prototype lab. If we can get a 3D printer that is relative to the downtown companies we can further expand our relevant course work. (12/6/2019)

Have a new partner company in WilsonArt. WilsonArt came to this college specifically to take advantage of out CTE student population. WilsonArt has two of their employees currently in our program using our process to update their skills. (4/29/2021)

Successes

	Articulation in place with OIT. Mentorship program with three (3) EOEM's for 5 students. (5/17/2019)
	Status
	In Progress

Goal	Goal Title	Initiative	Explanation
4	**Programs will actively reach out to local business and organizations that have a need for CAD / CAM and manufacturing personnel for internships, partnerships, and agreements. Ensure relevant skills as required by the industry.**	Community	Go out early into work place to learn and bring back to the college what skills are needed and changes to industrial landscape.

Measurable Target

Ten percent of students into the industrial setting and in reverse industrial at least one industry professionals into the college and guest lecturers and adjuncts to keep the study fresh and relevant.

Action Items

- Increase partnership agreements with employers for trainings, instruction, and internships
- Take students as much as possible into design and production environments to see what a future in that lifestyle and see cutting edge competitive businesses and employees.
- Invite fabricator and manufacturers, in person or virtually, to come into KCC as guest lecturers, and incorporate professional business personnel as adjunct instructors
- Partner with industry to see what industry needs, use College and potentially University assets to study and solve industry needs. Use College (and potentially University assets) to create and study non existing product lines for industrial base

Progress Notes

IAB created. Eight-member IAB board; all IAB membership use CAD and CAM skillset new employees. Have already modified coursework to more closely match our product to OEM needs. Have invited two OEM officers to speak in classroom settings (5/17/2019)

Will have last years students here in CAD program to discuss and demonstrate skills that are specific to his company and industry this winter, second and final course for CAD. We also have created an ongoing relationship to the Air Force at Kingsley to demonstrate and teach our students with tools we do not have in our machining program. All verbal instruction is in situ but practicum is courtesy of a former student and the Oregon Air National Guard. We are working on more practicum events at other companies; J-W, Columbia and Plasti-Duk are candidate companies due to the breadth of exposure that our students would be exposed to. (12/6/2019)

We have two students in their respective CWE courses sited at two new companies for internships --Intelifab and EcoSolar Electric. Additionally, we have CEW students at companies that have traditionally been closely aligned with KCC. We are in talks with Jeld-Wen to have one of their employees teach additional CAD courses here at KCC as an adjunct. This year we have brought in two OEM employees to aid in our bringing in new technology, they are expert in – 3D Printing. We added a 3D printer exactly like the model at Jeld-Wen with equivalent technology and processes. KCC used their employees as resources in the requirement study and initial training after delivery. (4/29/2021)
Successes
IAB created. Eight-member IAB board; all IAB membership use CAD and CAM skillset employees. Have already modified coursework to more closely match our product to OEM needs. (5/17/2019)
Status
In Progress

1B. HAVE YOU MET YOUR PREVIOUSLY SET GOALS? IF NOT, HOW DO YOU PLAN TO MEET THEM?

☐Yes

☒No

Most of the goals set out have been met, some exceeded by work, some by circumstance and luck. The most glaring goal missing is setting up of third-party testing for CAD (Autodesk and Solidworks), machining and fabrication (NIMS) and technical mathematics (SME). Contacts have been made with SME, NIMS and the software vendors, setting dates and getting funds for the third-party testing are a task for the program or college to put in place.

2. PROGRAM/DISCIPLINE DESCRIPTION AND OVERVIEW

2A. PROVIDE THE CATALOG DESCRIPTION OF THE PROGRAM.

The Advanced Manufacturing Engineering Technology AAS prepares students to apply basic engineering principles and technical skills to the identification and resolution of production problems in the manufacture of products. Includes instruction in machine operations, production line operations, engineering analysis, systems analysis, instrumentation, physical controls, automation, computer-aided manufacturing (CAM), manufacturing planning, quality control, and informational infrastructure.

The degree is beneficial for students who are new to design and fabrication technology and those who are currently in the field but looking to expand their skill base and increase their career opportunities. Students who have a non-technology career in another field may find this degree optimum for cross training into the CAD/CAM and manufacturing technology discipline.

2B. DESCRIBE HOW AND TO WHAT DEGREE THE PROGRAM DESCRIPTION REFLECTS THE PROGRAM'S OVERALL GOALS. IF IT DOES NOT, REVISE PROGRAM DESCRIPTION.

The program has been expanding its scope of technologies since inception. Many of the students and local companies have asked for some more of generic engineering and technical focus. Students and companies that are not so closely aligned with engineering design and fabrication (example civil and constructions companies) have requested more generic engineering and technology courses of instruction. In keeping with that frame of reference, topics have been added to existing classes and work is underway to add generic engineering and tech courses like Statics, Stress and civil type design software and processes.

The program is working with sister disciplines at KCC and OIT (Apprenticeship, Welding and Construction) to create more cross functional classes and skills.

2C. COMMUNITY LABOR MARKET NEED ANALYSIS AND PROJECTION

MACHINISTS (514041)

OREGON (ALL COUNTIES)

Description

Set up and operate a variety of machine tools to produce precision parts and instruments. Includes precision instrument makers who fabricate, modify, or repair mechanical instruments. May also fabricate and modify parts to make or repair machine tools or maintain industrial machines, applying knowledge of mechanics, mathematics, metal properties, layout, and machining procedures.

Projections					
Area	2020 Employment	2030 Employment	Annual Change Openings	Annual Replacement Openings	Total Annual Openings
Oregon	3,525	4,161	64	353	417

Wage Range 2021			
Area	**Median Hourly**	**Avg Annual**	**Middle Range**
Oregon	$25.69	$55,042	$20.66 - $31.29

Current Job Openings **There are 91 current job listings for this occupation.**			
Job Title	**Location**	**Order Number**	**Wage Offered**
Manual Machinist (Located in Roseburg, Oregon)	Roseburg	3290609	
CNC Machinist	Tualatin	3290437	
Knockout Operator - Titanium Aerospace Parts - Swing/Weekend Shift (Albany, OR)	Albany	3289110	DOE, Neg.
Experienced Machinist (All Shifts - $26/Hr and Up)	Hillsboro	3286046	
Entry Level Machinist (Starts at $19 - All Shifts Available)	Hillsboro	3286034	
CNC Machinist	Salem	3285676	
CNC Bevel Operator I - Swing	Oregon City	3284665	DOE
CNC Mill Machinist	Salem	3283360	$26.00/hr to $30.00/hr DOE
Layout Specialist	Portland	3281658	

Current Job Openings There are 91 current job listings for this occupation.			
Job Title	**Location**	**Order Number**	**Wage Offered**
CNC Machinist 2 - Turning (Day Shift) ($1,500 Sign-On Bonus Opportunity Available!)	Hillsboro	3281458	

Industries of Employment	
Industry	**2020 Employment**
Manufacturing	2,946
Wholesale Trade	184
Retail Trade	106
Administrative and Support and Waste Management and Remediation Services	60
Other Services (except Government)	102

Occupations with Similar Skills
Patternmakers, Metal and Plastic, Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic, Model Makers, Metal and Plastic, Tool and Die Makers, Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plas

Statewide Employment Analysis

Employment in this occupation in 2020 was somewhat larger than most occupations across the state. The total number of job openings is projected to be somewhat larger than most occupations in Oregon through 2030. This occupation is expected to grow at a somewhat faster rate than the statewide average growth rate for all occupations through 2030.

Reasonable employment opportunities exist.

Educational Requirements

The typical entry level education for this occupation is a High school diploma or equivalent. Those with a Postsecondary training (non-degree) have a competitive advantage in the labor market.

2C.I. HAS THE DEMAND FOR GRADUATES CHANGED IN THE PAST FIVE YEARS? IF SO HOW AND TO WHAT DEGREE?

☒Yes

☐No

With the increase of on-shoring or manufacturing and OEM's moving into Klamath County there has been an increased demand for a high-tech workforce.

2C.II. WHAT IS THE EXPECTED MARKET DEMAND FOR THE FUTURE? HOW MIGHT THE LABOR MARKET NEED PROJECTION AFFECT THE PROGRAM? HOW MIGHT THE PROGRAM ADJUST TO THESE PROJECTIONS?

These questions need to be answered in reference to your program.

Median Annual Salary

United States:	Oregon State:	Klamath Region:
$56,980	$59,530	$55,865

Prospective Jobs

Manufacturing Engineer	Automation Developer	Manufacturing Engineering Technologist
Project Engineer	Drafter	Material Technologist

2019-2029 Employment Projection

10.1% Growth

Entry Level Educational Requirements:

Associate Degree

All data was gathered from the State of Oregon Employment Department and the Bureau of Labor Statistics

Data provided for a manufacturing technologist position. For a different employment forecast, visit the State of Oregon Employment Department.

2D. DESCRIBE THE SPECIFIC CURRICULAR, INSTRUCTIONAL, OR OTHER CHANGES MADE IN THE PREVIOUS FIVE YEARS.

In the past five years we have been incorporating new software and processes to match the constant changes that the CAD and CAM industry requires - this annual update of software and processes is industry standard. The program has been adding modules to almost all courses that reflect tasks mastered in the industrial world that students are expected to show up with. We have moved from MasterCAM for Solidworks to generic MasterCAM due to the MC4SW being phased out in worldwide use. We have added "Elevation" drawings into our programs (Blueprint and AutoCAD) when seeing how much this is used in our local industrial area.

3. RESOURCES

3A. DESCRIBE FACULTY COMPOSITION, QUALIFICATIONS, AND PROFESSIONAL DEVELOPMENT.

Stanley Pence teaches a majority of the courses in the program and all of the core courses.

3A.I. WHAT PERCENT OF FACULTY ARE FULL-TIME? PART-TIME?

FIRST NAME	LAST NAME	EMAIL ADDRESS	Courses in curriculum instructed
Lauren	Aspell	aspell@klamathcc.edu	MFG 280
Michelle	Horne	horne@klamathcc.edu	MFG 280
Stanley	Pence	pences@klamathcc.edu	All core courses in curriculum
Filomeno	Rodriguez	filo.rodriguez@faculty.klamathcc.edu	MET 102 (Eng. Matl's) & MFG 120

3A. II. DESCRIBE FACULTY DEGREE ATTAINMENT. WHAT ARE THE MINIMUM DEGREE QUALIFICATIONS? WHAT PERCENT OF FACULTY EXCEED MINIMUM DEGREE QUALIFICATIONS?

ID	Instructor Name	Taught DC	Taught RG	Sub Group	Orginal Hire Date	School	Degree	Major
519317	Horne,	N	Y	ADMFT	9/1/2017	Oregon Institute	Bachelor of Science	
561251	Pence, Stanley	N	Y	F9MO	9/15/2016	San Jose State	Bachelor of Science	Business (finance)/Aero
524242	Rodriguez,	N	Y	ADJCR	9/29/1997	N/A	No Degree	Demonstrated

Faculty teaching core courses currently have received a bachelor's of science in engineering and an associate of science in manufacturing. The minimum degree of qualification is an associate of science in engineering, especially manufacturing and any of the design disciplines. Even more important that degree attainment in this discipline are active years of experience in design and manufacturing / fabrication. A background in next generation computer aided design (CAD) and computer aided manufacture (CAM) is critical to student and program success.

Currently, only the prime program instructor has exceeded the associated degree in design / manufacture.

3A.III. LIST THE SPECIFIC PROFESSIONAL DEVELOPMENT PROGRAM FACULTY ATTENDED INCLUDING BOTH ON-SITE AND OFF-SITE TRAININGS; HOW DID THE PROFESSIONAL DEVELOPMENT IMPACT INSTRUCTION, DESIGN, AND DELIVERY?

Any and all professional development is at site classes delivered by the machine and software vending companies. MasterCAM, and three specific machines that are used by this program have had the staff attend until mastery.

Professional development opportunities attended have been wrapped around the use of machines and software needed to teach both the classroom instruction and more importantly the labs. The primary staff has attended vendor training locally in Oregon and remotely in sites in Kentucky, Washington, Oregon and Wisconsin. With the capability to fully utilize the software and hardware purchased, our students can practice skills that will need to be replicated in industry.

The program staff is also working with our counterparts at OIT to ensure seamless differences in course delivery and content.

DIFFERENCES 3A. IV. ARE FACULTY COMPOSITION, QUALIFICATIONS, AND PROFESSIONAL DEVELOPMENT MEETING INSTRUCTIONAL NEEDS? IF NOT, DESCRIBE ANY PLANS THAT WILL ADDRESS THIS.

☐Yes
☒No
☐Somewhat
Faculty personnel are needed in the extreme. There is a single technical instructor, our bench is rather sparse. The program is working with allied disciplines to cross train so that there is more cross pollenated corporate knowledge available. All allied tech disciplines are sending each other to off-site tech training for our cross training and skills accumulation.

Too many of the staff need to travel to site specific classes to learn to use very specific pieces of hardware, processes, and technology. When we have exactly one person that is the subject matter expert (normal state) that is a recipe for disaster. We lost a key employee due to death and have still not fully recovered. The staff is trying their best to cross train all near tech family personnel.

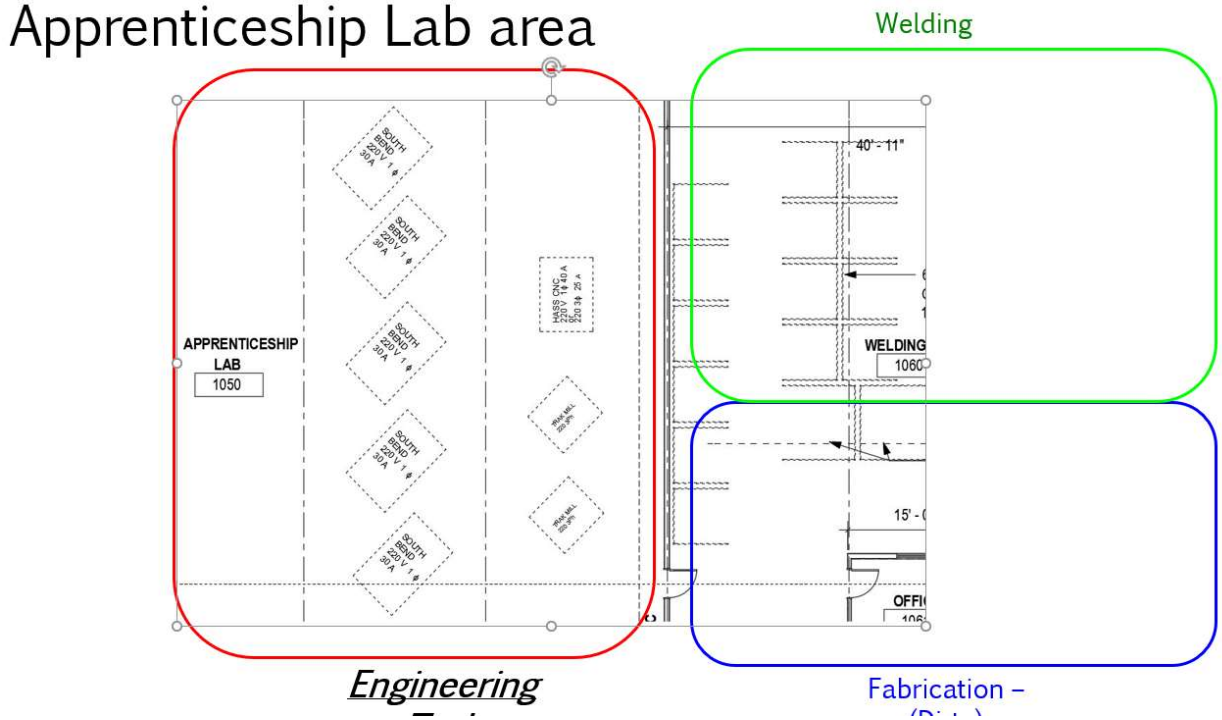
3B. DESCRIBE THE SPECIFIC FACILITIES, EQUIPMENT, AND MATERIALS USED BY THE PROGRAM.

3B.I. ARE FACILITIES MEETING INSTRUCTIONAL NEEDS? IF NOT, DESCRIBE ANY PLANS THAT WILL ADDRESS THIS.

☐Yes
☒No
☐Somewhat

Many of our machines and technologies have very specific maintenance and repair skills needed. Currently, the teaching staff are the only ones that know anything about many of our machines and software. IT and facilities needs time, funds and opportunity to learn how these machines and technologies work, and how they are maintained and repaired.

In answering space consideration issues, the new space in the Apprenticeship Center should alleviate most of the dual sited labs at KCC and OIT and allow us to be on a single campus.



3B.II. IS EQUIPMENT MEETING INSTRUCTIONAL NEEDS? IF NOT, DESCRIBE ANY PLANS THAT WILL ADDRESS THIS.

☐Yes

☒No

☐Somewhat

We have had a dearth of critically needed equipment to teach this curriculum. Due to space limitations, we were unable to purchase that hardware. With the new facility and hardware to populate it we should be in a much more tenable situation. Most of our assets are at OIT and with our move to the KCC campus additional assets will now have to be purchased and sited in the square footage available. The footprint has trebled for this program and that should meet our near-term goals.

3B.III. ARE INSTRUCTIONAL MATERIALS MEETING PROGRAM NEEDS? IF NOT, DESCRIBE ANY PLANS THAT WILL ADDRESS THIS.

☐Yes
☐No
☒Somewhat

There are instructional materials that would be useful in making difficult to describe processes and skills concrete for our students. We have received licenses for computerized numerical control (CNC) simulation software but need training for staff and video instructions for the students to understand the process and power of this technology.

Many of the concepts are best instructed using audio and video tools. Too often, the instructor demonstration and the student application are separated by too many days and a refresher is the only tool that would fill the bill. We have created audio/video instructional media for our primary machining course, with our equivalent member at the OIT MMET staff, (created by the program staff with CTL tech assistance), more of these types of tools would help our students.

3C. DESCRIBE THE INSTRUCTIONAL SUPPORT SERVICES THE PROGRAM USES.

3C.I. REVIEW LRC HOLDINGS FOR RELEVANCY AND CURRENCY TO PROGRAM.

LRC has a full complement of our software loaded on half of the machines in their area available on many hours that the CAD & CAM lab is not. All of our CAM software is loaded (using served licenses) so that the student has any and all specialized software to work off hours.

Consortium
As a member of the Sage Library System, the KCC library provides students and faculty access to the holdings more than 70 libraries in 15 counties of eastern and central Oregon. The library is also a member of the Orbis Cascade Alliance courier system, which provides students access to the holdings of more than 200 libraries in 3 states.

Electronic Database Resources:
Main

1. Science Reference eBook Collection
2. Films on Demand – Careers & Job Search – Career Fields – Science, Technology, Engineering & Mathematics
3. Films on Demand – Engineering
4. Gale OneFile – Computer Science

Generic/Supplementary/Supportive

1. Computer Source
2. Directory of Open Access Journals (DOAJ)

Physical Holdings:

Reserves

Prerequisites

1. Technology for Success: Microsoft Office 365 & Office 2019
2. The Art of Public Speaking (12th ed.) – Lucas, Stephen
3. Understanding Rhetoric: A Graphic Guide to Writing (2nd ed.) – Losh, Elizabeth M. (Elizabeth Matthews), (author); Alexander, Jonathan (author); Cannon, Kevin (illustrator); & Cannon, Zander (illustrator) (2 copies)
4. Conspiracy Theories in American History: An Encyclopedia – Knight, Peter (2 volumes)
5. Conspiracies and Secret Societies: The Complete Dossier – Steiger, Brad & Hansen Steiger, Sherry
6. Rules for Writers (9th ed.) – Hacker, Diana; Sommers, Nancy I.; & Huster, Kimberli
7. From Critical Thinking to Argument: A Portable Guide (5th ed.) – Barnet, Sylvan
8. The Miniature Guide to Critical Thinking Concepts and Tools (8th ed.) – Paul, Richard, & Elder, Linda (2 copies)
9. The Global Warming Reader: A Century of Writing about Climate Change – McKibben, Bill
10. Algebra and Trigonometry – Blitzer, Robert
11. College Algebra – Lial, Margaret L.; Hornsby, John; Schneider, David I.; & Daniels, Callie J. (4 copies)
12. Chemistry: A Molecular Approach – Tro, Nivaldo J.
13. Chemistry: The Central Science – Brown, Theodore L.
14. Conceptual Physics – Hewitt, Paul G.
15. Physics for Scientists and Engineers: A Strategic Approach with Modern Physics – Knight, Randall Dewey

Core + Electives

1. Principles and Practice: An Integrated Approach to Engineering Graphics and AutoCAD 2019 – Shih, Randy H.
2. Parametric Modeling with SolidWorks 2018 – Shih, Randy H., & Schilling, Paul J.
3. Parametric Modeling with SolidWorks 2019 – Shih, Randy H., & Schilling, Paul J.
4. Machining Fundamentals – Walker, John R., & Dixon, Bob
5. CNC Machining – Gizelbach, Richard (2 copies)
6. Machinery's Handbook: A Reference Book for the Mechanical Engineer, Designer, Manufacturing Engineer, Draftsman, Toolmaker, and Machinist – Oberg, Erik; Jones, Franklin D.; Horton, Holbrook Lynedon; Ryffel, Henry H.; & McCauley, Christopher J.
7. Getting the Job You Really Want: A Step-by-Step Guide to Finding A Good Job in Less Time – Farr, J. Michael (2 copies)
8. What Color is Your Parachute? 2020: A Practical Manual For Job-Hunters And Career-Changers – Bolles, Richard Nelson
9. New Perspectives Microsoft® Office 365 & Excel 2016: Comprehensive – Parsons, June Jamrich; Oja, Dan; Carey, Patrick; & DesJardins, Carol A.
10. American Red Cross First Aid/CPR/AED Participant's Manual – American Red Cross
11. Trigonometry – Lial, Margaret L. (3 copies)
12. Student Solutions Manual: Elementary Statistics using Excel – Loyer, Milton

13. Elementary Statistics – Triola, Mario F. (2 copies)
14. Fundamentals of Statistics – Sullivan, Michael
15. Calculus: Early Transcendentals – Rogawski, Jon (2 copies)
16. Blueprint Reading for Welders – Bennett, A. E. & Siy, Louis J.
17. Welding: Principles and Applications – Jeffus, Larry F.
18. Practical Strategies for Technical Communication – Markel, Michael H. (3 copies)

Shelf

Core

1. Basic Machines and How They Work – United States Bureau of Naval Personnel
2. Engineering Formulas – Gieck, Kurt. & Gieck, Reiner
3. The Elements of Mechanical Design – Skakoon, James G.
4. Detailed Mechanical Design: A Practical Guide – Skakoon, James G.
5. Mechanisms and Mechanical Devices Sourcebook – Chironis, Nicholas P. & Sclater, Neil (editors)
6. Machining Fundamentals – Walker, John R., & Dixon, Bob
7. The Perfectionists: How Precision Engineers Created the Modern World – Winchester, Simon
8. Detailed Mechanical Design: A Practical Guide – Skakoon, James G.
9. Agricultural Mechanics: Fundamentals & Applications – Herren, Ray V.
10. Engineering Formulas – Gieck, Kurt & Gieck, Reiner
11. Fire Service Hydraulics and Water Supply – Wieder, Michael A.
12. Mike Holt's Illustrated Guide to Basic Electrical Theory – Holt, Charles Michael
13. Fundamentals of Digital Logic with Verilog Design – Brown, Stephen D., & Vranesic, Zvonko G.
14. Troubleshooting and Repairing Diesel Engines – Dempsey, Paul
15. Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives – Mi, Chris; Masrur, Abul; & Gao, David Wenzhong
16. Medium/Heavy Duty Truck Engines, Fuel & Computerized Management Systems – Bennett, Sean
17. Engineering in the Ancient World – Landels, John G.
18. Engineering Fundamentals and Problem Solving – Eide, Arvid R.
19. The Ancient Engineers – De Camp, L. Sprague
20. Automotive Engines: Diagnosis, Repair and Rebuilding – Guilles, Tim & Halderman, James D.
21. Fundamentals of Engineering: The Most Efficient and Authoritative Review Book for The New FE/EIT Exam – Farnum, D. & Potter, Merle C.
22. Engineering Principles of Agricultural Machines – Srivastava, Ajit K.
23. Physics for Scientists and Engineers: A Strategic Approach – Knight, Randall Dewey
24. Troubleshooting and Repairing Diesel Engines – Dempsey, Paul
25. Physics for Scientists and Engineers: A Strategic Approach: With Modern Physics – Knight, Randall Dewey
26. The Design of Everyday Things – Norman, Donald A.
27. Medium/Heavy Duty Truck Engines, Fuel & Computerized Management Systems – Bennett, Sean
28. Welding Handbook: Engineering, Costs, Quality, and Safety – American Welding Society & Kearns, W. H.
29. Invention by Design: How Engineers Get from Thought to Thing – Petroski, Henry

30. The Seventy Wonders of the Modern World: 1500 Years of Extraordinary Feats of Engineering and Construction – Parkyn, Neil
31. Welding Handbook – American Welding Society, Weisman, Charlotte & Kearns, W. H.
32. Why Buildings Fall Down: How Structures Fail – Levy, Matthys, & Salvadori, Mario

The program needs to look at the text offerings at OIT for sophomore level courses, like Statics and Stress, and see what is offered there. Those specific courses are topics that we will need to add courses to our curriculum.

3C.II. REVIEW PROGRAM STUDENT USE OF TUTORING AND E-TUTORING.

Tutoring for core classes is difficult to impossible for the tutoring center. Most tutoring has to come from a dedicated T/A due to very specified skill set.

Student report that they have received extremely useful support when they have been tutored in mathematics, chemistry and physics.

Please see Appendix 7A for the exact usage of the Tutoring Center by MET students from Winter 2019 through Fall 2021.

3C.III. REVIEW PROGRAM STUDENT USE OF TESTING SERVICES.

Testing center is extremely helpful. The MET program does not have to spend precious class time taking tests and quizzes. The only test given in any core class is finals due to not using class time to sponsor a proctored test.

Year	Instructor Exams
2016-2017	Did not track
2018	Did not Track
2019	4
2020	21
2021	16
2022*	1

*As of end of Winter Term

3C.IV. REVIEW OTHER INSTRUCTIONAL SUPPORT SERVICES (STUDENT CLUBS, ADVISING, TRIO, VETERANS SERVICES, ETC.) IF APPLICABLE.

Students in this course of instruction have utilized and have benefited from general student advising, specialized tracking and advising from TRIO and Veterans Services. Career services has placed students in internships and local technical jobs. University bound students have come to me with a myriad of

questions about programs built to articulate into university programs and I have referred them to the groups that specialize and advise students -- Badger to Owl is the program I get the most questions about. The groups on campus that specialize in contracting and advising universities and industries have been a nice asset for a program lead.

3D. DESCRIBE TO WHAT DEGREE THE PROGRAM USES THE COLLEGE'S LEARNING MANAGEMENT SYSTEM (CANVAS) FOR ALL METHODS OF DELIVERY (FACE-TO-FACE, ONLINE, SYNCHRONOUS, HYBRID).

This program is completely linked to Canvas for all work, descriptions of assignments, tests, quizzes and write up for CAM and 2D and 3D models for AutoCAD and Solidworks. The MET Program uses a multimode format for all classes due to needed flexibility to match students' schedules – many of our students are active employees that must view Canvas zoomed classes outside of class hours. A percentage of our students do not live in south-eastern Oregon and must either attend on line or watch zoomed audio/video classes after the fact.

We also use an LMS called SolidProfessor ® to reinforce and augment classroom instruction in all CAD and two of the three CAM courses.

4. EFFECTIVENESS

4A. STUDENT LEARNING OUTCOMES ASSESSMENT

ADV_REQ_CDE	Course	Number of assessments
MET242	CAD for Mechanical Design II	1
MFG120	Manufacturing Process I	1
MFG122	Manufacturing Process III - CNC	1

4A.I. COURSE LEARNING OUTCOMES (CLO)

Course Code Key					
	Has Result Submitted		Has Result Submitted		Has Plan And Result Submitted

CLOs		
Course Code	**Term Year**	**Instructor**
MFG 120 01	FA2018	Pence, Stanley 561251

4A.I.1 DESCRIBE EVIDENCE OF STUDENT PROFICIENCY IN CLOS. IF THERE IS NO EVIDENCE, DESCRIBE PLANS TO ADDRESS THIS.

Each and every assignment in our manufacturing and design course has an assignment that must be turned in to the instructor. Every assignment is modeled on a deliverable that I had to produce for downstream users in all the profit-making companies I ever worked in.

Every week there is a least one, and usually more than one, assignment due for review and grading that is equivalent to a job that would have to be submitted to a “drawing checker” or manufacturing supervisor. Most machining and fabrication tasks end up with a physical artifact that must be created and analyzed in a QA environment equivalent to a for profit work site.

4A.I.2 DESCRIBE THE SPECIFIC PROCESS FOR ADVISORY COMMITTEES FOR REVIEWING COURSE CONTENT AND OUTCOMES GUIDES (CCOGS). IF THERE IS NO PROCESS, DESCRIBE PLANS TO ADDRESS THIS.

We have industry advisor board members that have students in our program. Many of our classroom tasks are tasks brought in from the IAB members companies. Many of our students work on site at IAB member facilities where there can see what we do and they can bring in representative work to be accomplished.

KCC - Manufacturing Engineering Technology	
Industry & Academia Advisory Board	
Columbia Forest Products	Aaron Frei
TC (Trans Canada) Energy	Mike Hatchett
Vioweiss Co	William Wiessmeyer
WilsonArt	Rebecca Armstrong
JELD-WEN	Derek Kindt
Collins Products LLC	Eric Rose
Oregon Air National Guard (OANG)	M/Sgt Paul T Allen
Quality Machine Parts (QMP)	Sean Christ – Mark Haack
S&S Manufacturing	Frank (Guy) Jakubowski
Small Business Development Council	Kat Rutledge
T&S Manufacturing	Matt Terrell

Fremont Millwork	Wayne or Ben Alexander
Oregon Institute of Technology	Dr. David Culler
Dr. Kristen Lebkowsky	Henley Senior High School

4A.I.3 WHICH COURSES HAD LEARNING OUTCOMES REVISED/UPDATED AND WHY?

Most of the courses in the MET program do not have course learning outcomes assessment scheduled due to the low number of students in each class.

All courses have had granules of learning outcomes revised almost quarterly. The general thrust is stable but the detail is in constant flux due to changes of materials, process and tools. A good example is incorporating “elevation” drawing into our AutoCAD courses. The text use by OIT and KCC does not have elevation drawing as a core skill but on the recommendation of a former student and IAB board member we have added that skillset to the mxi. We have also gone back to the author of the text and publisher to get this skill added to the text.

4A.I.4 IDENTIFY AND GIVE EXAMPLES OF CHANGES MADE IN INSTRUCTION THAT OCCURRED AS THE RESULT OF CLO ASSESSMENT. IF THIS HAS NOT OCCURRED, DESCRIBE PLANS TO ADDRESS THIS.

Previously described, the basic outcomes have not changed, but the fundamental tasks and processes evolve to match the requirements of the industrial community. We are currently working up new technologies to be taught that will match future changes in the IAB membership. Some changes will be moving from current AutoCAD based format, process and product to Inventor, Revit, FeatureCam, and 3D printing outcomes.

4A. II PROGRAM LEARNING OUTCOMES (PLO)

https://info.klamathcc.edu/AM/SLO%20Assessment%20Plans%20and%20Reports/Forms/AllItems.aspx

Program Learning Outcomes

Upon successful completion of the program, students will be able to:

- Create products that adhere to print specifications and meet form, fit, and function.
- Create and plot 2D, 3D, and solid models with standard notations.
- Create detail parts, assemblies, drawings, presentations, plans and analysis tools that fill all informational needs for shop floor fabricators.
- Analyze manufacturing processes and procedures to ensure products meet industry competitive standards.
- Create plans, programs, and processes that match industrial best practice.

- Use powered systems and tools safely and effectively.
- Use computer applications in the design and manufacture of products and processes.

Course Code Key					
	Has Result Submitted		Has Result Submitted		Has Plan And Result Submitted

PLOs		
Course Code	**Term Year**	**Instructor**
MET 242 01	SP2021	Pence, Stanley 561251
MFG 122 01	SP2021	Pence, Stanley 561251

4A.II.1 DESCRIBE EVIDENCE OF STUDENT PROFICIENCY IN PLOS. IF THERE IS NO EVIDENCE, DESCRIBE PLANS TO ADDRESS THIS.

Each detail portion of each course has a final product that must be created matching ANSI standards and SME format and codes. The detail parts of each subtask add up to a synergistic skill set in demand by practitioners. The last thing that a student must do is go out into the design and fabrication world and demonstrate the ability to understand, comprehend and create physical prototypes and models in a working environment. Our students are currently in R&D roles in a 3D printing company in town, at the Air Force base creating new processes and at Jeld-Wen in their R&D environment.

4A.II.2 IDENTIFY AND GIVE EXAMPLES OF CHANGES MADE IN INSTRUCTION THAT OCCURRED AS THE RESULT OF PLO ASSESSMENT. IF THIS HAS NOT OCCURRED, DESCRIBE PLANS TO ADDRESS THIS.

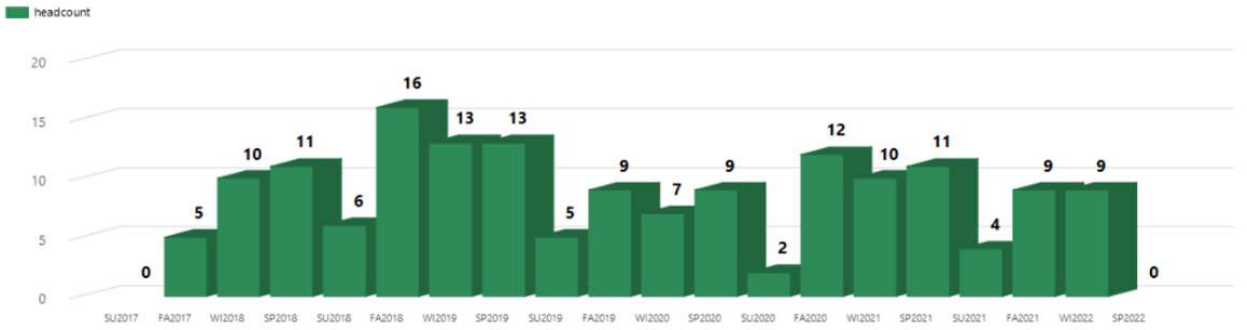
The final results that students produce in the program have not changed. Design and fabrication in theory and outcome have not changed since the beginning of the industrial revolution; how we create this production is in the midst of a revolution. The general category of the PLO is stable, the details of how we go about it evolve every year. The materials used, numerical control, 3D printing, CAD (Computer Aided Design), CAE (Computer Aided Engineering) and robots are changing at the granular level how we create and ultimately what is created. Flexibility, nimbleness, and customization have replaced a large lot of one size fits all. The path toward customization, nimble design and production is change the substrate for a program outcome.

In days gone by, paper design and conventional fabrication techniques led to mass production of similar products. Now single lot of constantly changing design, fab and materials have made the survivors in this environment capable of changing direction in hours not months and years. The tools used by the survivors continue to move toward maximal flexibility. Top Gun used to have a saying: ‘ultimate

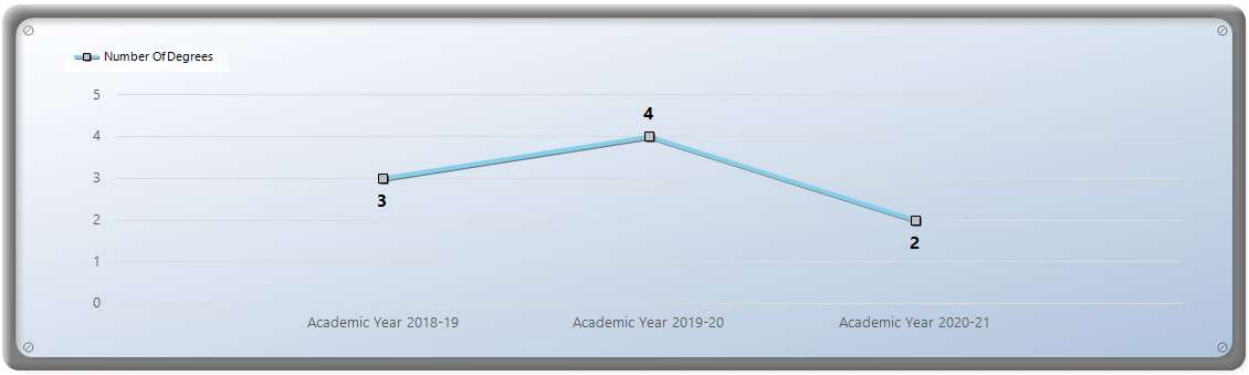
flexibility is to rigid a term,' we must train our students in this path and kind of thought. The program objectives don't really change, the pace and path to success do – either we ride the tiger or are eaten by it.

4B. STUDENT SUCCESS

4B.I. DESCRIBE ENROLLMENT TRENDS AND PLANS TO ADDRESS THEM.



4B.II. DESCRIBE DEGREE AWARDED TRENDS AND PLANS TO ADDRESS THEM.



4B.III. REVIEW TRANSFERABILITY OF PROGRAM.

Oregon Institute of Technology

All but three of the courses needed for an associate of science are transferable to OIT. The three courses that are by nature not transferable (non-calculus based) are none the less taken by a majority of the students in the program to prepare them to take an equivalent university course. A minority of the students that take the three courses at university transfer back those credits toward their AS. We have sent half a dozen students to OIT and have received roughly the same number from OIT transfer to KCC to receive an A.S. from KCC's Engineering Tech program (MET). Roughly 90 percent of our classes are directly transferable to the OIT mechanical or manufacturing engineering degree of study.

Oregon State University

Some of our classes in this curriculum are not directly transferrable to OSU. OSU does not have the robust hands-on portion of study that OIT and KCC have. The students that have attended our instructional classes have stayed a

short time with us and taken fewer of our offerings. Students that plan to attend OSU and U of O are interested in our analytical courses almost exclusively. We have had three students transfer to OSU to my knowledge, mostly to study a more generic engineering path. To date, most OSU transfers have been interested in Civil and Industrial engineering. In keeping with the first two years of most engineering and technology programs requiring very similar work, we are looking to increase our offerings and add Statics and Strengths of Materials. We have the opportunity to be an incubator for a more generic engineering and technology course of study, with multiple paths to a varied listing of technical degrees. Roughly 80 percent of our classes are directly transferable to the OSU Industrial and Manufacturing Engineering course of study.

4B.III.1 DESCRIBE TRANSFERABILITY FROM HIGH SCHOOL TO KCC TO OUS.

The program has articulation agreements in place with Oregon universities. Most of our students interested in pursuing further study have transferred to OIT, many of our students are dual enrolled both here and at OIT. Our overlap of study for first two year at University are 90% at OIT and roughly 80% at OSU.

We have programs of study with Henley and Eagle Ridge high schools. We are all using the same texts and processes as the program at OIT. The two high schools are using the Canvas shells created here at KCC to replicate the process -- down to assignments, tests and quizzes as much as possible. I meet with the instructor staff of the high schools to ensure we are in step and creating a product equivalent to the university requirement

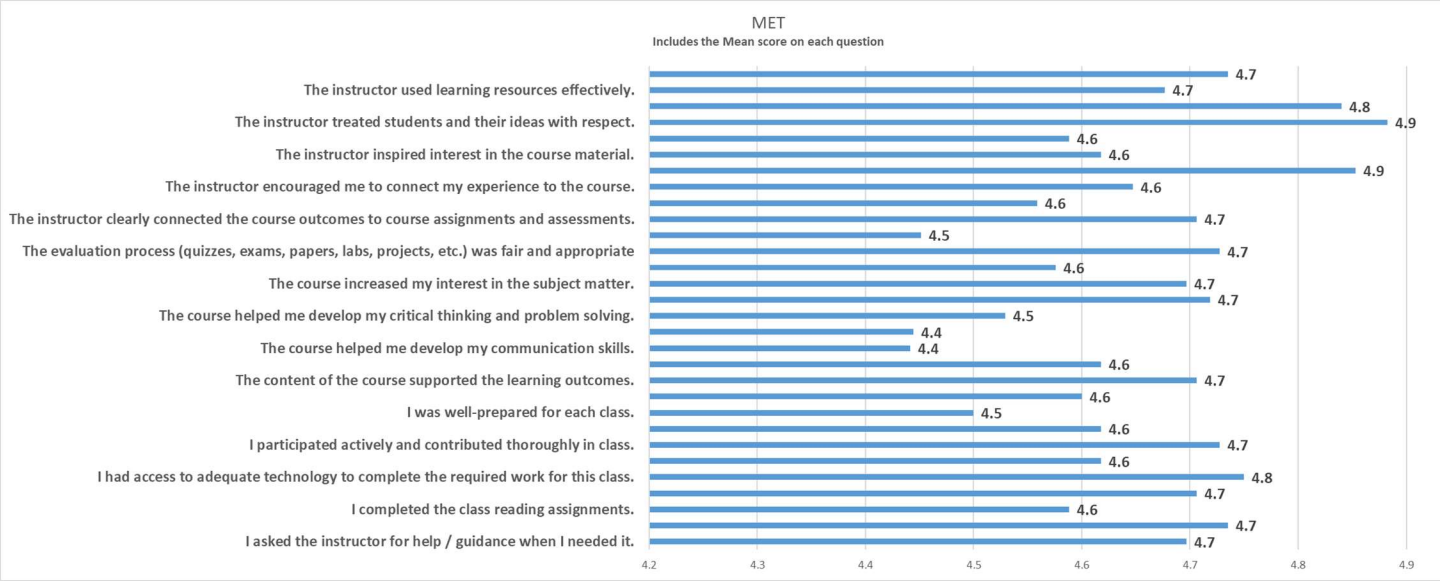
4B.III.2 HAS THIS CHANGED OVER THE LAST FIVE YEARS? IF SO, WHY? WHAT ARE THE IMPACTS ON STUDENTS AND THE PROGRAM?

The MET program is not yet a five-year-old program. We are looking at the requirements that the university system is moving to, and looking to move to, to ensure that we stay aligned with the university path. Sometimes we see a divergence between where the university system and IAB's and have to figure out which has the greatest impact for success for the greatest number of our students.

4C. STUDENT ENGAGEMENT AND SATISFACTION

4C.I. COURSE EVALUATIONS DATA AND ANALYSIS

https://mykcc.klamathcc.edu/ICS/Faculty_CRM/Course_Evaluations.jnz



4C.I.1 DESCRIBE CHANGES MADE IN INSTRUCTIONAL METHODS BASED ON STUDENT COURSE EVALUATION DATA. IF THIS HAS NOT OCCURRED, DESCRIBE PLANS TO ADDRESS THIS.

Our methodology has been in a constant state of change from the inception of the program four years ago. We have included external application platforms for our students to avail themselves of resources beyond the normal classroom and lab opportunities. Due to Covid restrictions, we have become experts in DE platforms and process.

All classes are recorded and lectures are available to off-site students, some of our students do not even reside in Oregon. We have had 6 remote students that have never visited campus and we have had to made additional methodology for them. This change of method was then made available to face-to-face students as a resource. For many classes, we have worked with the MMET staff at OIT to create videos for students to view and review. Many times, there is a tremendous time difference between the process demonstration for the first students and the later students completing the lab or process. Our audio / video library allows the “tail end Charlie” to have a process demonstration near the time they are required to produce the part. In a discipline with as much information, with long algorithm processes, to be able to see the lecture or demo at the student’s speed of retention makes this difficult discipline possible.

4C.I.2 DESCRIBE CHANGES MADE TO THE COURSE BASED ON STUDENT COURSE EVALUATION DATA.

Software, hardware and skillset modification has been ongoing from program inception until today. We have received more critical information from recent graduate input than from current students. As soon as students have been enrolled into either the university system (OIT and OSU) we have received information on gaps between our program and meshing with OUs requirements. We have endeavored to incorporate both the same texts and curriculums as much as possible to replicate the first two-year experience at university. Students that have gone to either industrial concerns or combination industrial and university have been a tremendous resource to let us know any technical holes in the skillset required to succeed. I have a scheduled plan to ensure I communicate with former students to get their

opinion of where they were well served and to see if there are any insufficiencies in our program learning objectives.

4C. II JOB PLACEMENT DATA AND ANALYSIS (IF AVAILABLE)

Student Graduates

Klamath Community College - List of Engineering Technology Program Graduates			
Number	Name	Date Conferred	Employment After Graduation
1	Boudon, Jason	Jun-18	Fabricator - Salem OR
2	Heap, Joshua	Jul-18	Plastics Fabricator, Klamath Falls OR
3	Kindt, Derek	Aug-18	Jeld-Wen, Klamath Falls, OR
4	DeCrans, Kenneth	Jun-19	Columbia Forest Products, Klamath Falls, OR
5	Epperly, Gregory	Jul-19	Jeld-Wen, Klamath Falls, OR
6	Walter, Niles	Aug-19	OIT & J-W, Klamath Falls, OR
7	Ham, Marcius	Jun-20	Jeld-Wen, Klamath Falls, OR
8	Moore. Gillian	Jul-20	At Home Parent, Klamath Falls, OR
9	Stanek, Connor	Jun-21	Fabricator, Grants Pass, OR

5. BUDGET

5A. PROVIDE FIVE-YEAR COST MARGIN DATA AND ANALYSIS.

Academic Year	AY 2016-17	AY 2017-18	AY 2018-19	AY 2019-20	AY 2020-21
Tuition	$ -	$ 15,023.50	$ 44,872.50	$ 22,358.00	$ 25,412.00
Enrollment	0	62	178	81	94
Cost In Progress	$ -	$ 59,711.49	$ 94,025.76	$ 69,354.42	$ 64,678.05
Margin In Progress	$ -	$ (44,687.99)	$ (49,153.26)	$ (46,996.42)	$(39,266.05)
FTE	-	4.18	12.53	7.03	7.61

5B. SUMMARIZE PREVIOUS ANNUAL PROGRAM VIABILITY STUDY RESULTS AND EXPLAIN HOW CHANGES IMPACTED STUDENT LEARNING OUTCOME PROFICIENCY. IF THIS HAS NOT OCCURRED, DESCRIBE PLANS TO ADDRESS THIS.

None complete

5C. EXPLAIN ANY BUDGETARY CHALLENGES AND ANY PLANS TO ADDRESS THEM.

There is a never-ending list of technologies that could be incorporated into a program like this one. The laboratory machines are rather expensive, so a prioritized list has been created to match monies available to the most useful technologies and tools to match current and future needs. We have been

researching to ensure our needs and dollars match, and sometime complement, other programs, like Apprenticeship and Welding.

We have been a tenant at OIT and that has made this program viable. We have ordered and sited multi-mode machines here and at OIT, this has allowed us to get as much efficiency as possible. Our recurring costs are rather modest, it is our capital costs that are prohibitive.

In conversations with the MMET (Manufacturing, Mechanical Engineering and Technology) leadership at OIT we have, and plan to in the future, allow joint use of assets for both student populations, minimizing the need for redundant copies of expensive hardware in close proximity.

As the monument machines and software are purchased and taken off the *needed* list, a maintenance and a training fund will have to be established to get and keep our facility's personnel up to par on maintaining and updating this new and unknown (to them) technology.

Our biggest budgetary challenge is anticipating future needs and purchasing the equipment and software to teach our students, using machines and processes, useful to the hiring community here and remotely.

6. CONCLUSION

6A. DESCRIBE PROGRAM STRENGTHS.

The major program strength is this is a forward leaning program that in most cases is slightly ahead of our local industry in thought and plans. We have new blood coming into the area to create a symbiotic relationship with the school and the companies. Two new companies have specifically come to the area for what the community offers and what KCC and OIT offers for useful talent.

Flexibility of instruction and offerings is tremendously important in a rapidly moving field.

Continuing our ties with our federal (Air Force), university (OIT - MMET department leadership) and commercial industrial entities is extremely valuable to strengthen the program now and in the future.

6B. DESCRIBE PROGRAM WEAKNESSES.

Lack of depth in the instructor pool, both on campus and in the wider community. Lack of time for the limited staff. Third party testing is needed for certifications and credentialing and has not been offered, yet.

6C. DESCRIBE SUPPORT NEEDED.

The program needs to expand its offering times to the students, both industrial and traditional. For us to grow and prosper, more technical talent is needed to expand offerings, e.g. classes like Stress and more types of classes like Inventor and Revit. In lieu of more technical staff, some administrative help is needed to reduce the non-value-added time consumed outside the classroom and lab.

Some classes are sorely missing or taught so infrequently as to be de facto not available. This program needs a technical mathematics offering so that non-university bound students can see a path forward, this has the possibility of doubling student. Some Chemistry and Physics courses (university transferrable) needed for the university bound students need to be offered at least annually.

6D. CREATE NEW GOALS AND LINK THEM TO THE STRATEGIC PLAN.

Third party testing up and functional for CAD, machining, fabrication, mathematics and numerical control programming.

Hire more adjunct instructors to match the increase in sophomore year class offerings. Our students need to show up at a university with more of the second-year courses like their university contemporaries.

Merge one more multi-disciplinary courses, like our Engineering Materials, Basic Hydraulic and Electricity courses.

7.A. APPENDICES

Advanced Manufacturing Engineering Technology AAS – Usage of Tutoring Services at KCC

WINTER 2019	SPRING 2019	SUMMER 2019	FALL 2019
CGS 100= 3	CGS 100= 25	CGS 100= 12	CGS 100= 8
CAS 133= 133	CAS 133= 3	CAS 133= 28	CAS 133= 63
SPE 111= 1	SPE 111= 118	SPE 111= 9	SPE 111= 34
WRI 121= 68	WRI 121= 20	WRI 121= 19	WRI 121= 37
WRI 122= 46	WRI 122= 30	WRI 122= 25	WRI 122= 19
MTH 111= 105	MTH 111= 139	MTH 111=139	MTH 111= 160
Arts and Letters	Art and Letters	Arts and Letters	Art and Letters
ART 213= 1	MUS= 1	0	SPA 101= 5
Social Science	Social Science	Social Science	SPA 102= 3
HST 102= 2	HST 102= 1	PSY 201= 8	Social Science
HST 201= 1	HST 103= 10	Science	ECO 201= 1
PSY 101= 3	HST 201= 1	0	HST 201= 1
PSY 201= 13	HST 202= 1	Tech core	PSY 101= 1
SOC 204= 1	PSY 101= 1	0	PSY 235= 4
Science	PSY 201= 4	Electives	Electives
CHE 104= 20	PSY 233= 1	MTH 243= 2	MTH 112= 60
CHE 105= 17	Science		MTH 243= 8
CHE 222= 2	CHE 104= 49		MTH 251= 58
Tech core	Tech core= 0		Tech Core
MFG 121= 2	Electives		0
Electives	MTH 112 =26		
CAS 170= 2	MTH 243= 25		
MTH 112= 17	MTH 251= 2		
MTH 243= 45	WRI 227 = 12		
MTH 251= 10	SPA 101= 17		
MTH 252= 8			

WINTER 2020	SPRING 2020	SUMMER 2020	FALL 2020
CGS 100= 0	CGS 100= 0	CLOSED	CGS 100= 0
CAS 133= 49	CAS 133= 11		CAS 133= 9
SPE 111= 25	SPE 111= 17		SPE 111= 1
WRI 121= 74	WRI 121= 3		WRI 121= 0
WRI 122= 19	WRI 122= 2		WRI 122= 0
MTH 111= 85	MTH 111=0		MTH 111= 1
Arts and Letters	Arts and Letters= 0		Arts and Letters= 0
ART 265= 9	Social Science		Social Science= 0
Social Science	PSY 101= 1		Science=
ECO 201= 2	Science		CHE 104= 2

PSY 235= 2 Science CHE 104= 12 CHE 222= 9 Tech core= 0 Electives CAS 170= 45 Tech core MFG 121= 2 Electives CAS 170= 2 MTH 112= 11 MTH 243= 53 MTH 252= 22 MTH 254= 23	CHE 104= 5 Tech core=0 Electives CAS 170= 1		CHE 221= 3 Tech core= 0 Electives MTH 243= 6

WINTER 2021	SPRING 2021	SUMMER 2021	FALL 2021
CGS 100= 0 CAS 133=5 SPE 111=12 WRI 121= 37 WRI 122= 54 MTH 111= 70 Arts and Letters ART 265= 1 Social Science HST 102= 0 HST 201= 0 PSY 101= 0 PSY 201= 0 SOC 204= 0 Science CHE 104= 2 CHE 105= 4 CHE 222= 39 Tech core MFG 121= 2 Electives CAS 170= 10 MTH 112= 2 MTH 243= 0 MTH 251= 0 MTH 252= 0 PHL 103= 1	CGS 100= 1 CAS 133= 0 SPE 111= 0 WRI 121= 16 WRI 122= 13 MTH 111= 9 Arts and Letters ART 265= 0 Social Science ECO 201= 2 PSY 235= 7 Science CHE 104= 20 CHE 223= 6 Tech core= Electives CAS 170= 45 Tech core MFG 121= 2 Electives CAS 170= 29 MTH 112= 3 MTH 243= 2 MTH 252= 0 MTH 254= 0	CGS 100= 0 CAS 133= 2 SPE 111= 5 WRI 121= 1 WRI 122= 0 MTH 111= 8 Arts and Letters ART 265= 0 Social Science ECO 201= 0 PSY 201= 5 Science CHE 104= 0 CHE 223= 0 Tech core= Electives CAS 170= 45 Tech core MFG 121= 2 Electives CAS 170= 29 MTH 112= 3 MTH 243= 12 MTH 252= 0 MTH 254= 0	CGS 100= 2 CAS 133= 15 SPE 111= 0 WRI 121= 8 WRI 122= 18 MTH 111= 8 Arts and Letters ART 265= 1 Social Science ECO 201= 0 PSY 235= 6 Science CHE 104= 2 CHE 223= 0 Tech core= Electives CAS 170= 45 Tech core MFG 121= 2 Electives CAS 170= 29 MTH 112= 3 MTH 243= 1 MTH 252= 0 MTH 254= 0

8. INSTRUCTIONAL PROGRAM REVIEW RUBRIC

	Highly Developed	Developed	Emerging	Initial
1—Accomplishments in Achieving Goals	Exhibits ongoing and systematic evidence of goal achievement.	Exhibits evidence of goal achievement.	Exhibits some evidence that some goals have been achieved.	Minimal evidence that progress has been made toward achieving goals..
2—Labor Market Projection	Thoroughly explains projected market demand and potential effects on program; presents highly developed plan to address projection.	Explains projected market demand and discusses several possible actions to address projection.	Minimally explains projected market demand and lists one or two actions to address projection.	Presents labor market demand without analysis/explanation and fails to list possible actions to address projection.
3—Resources				
Professional Development	Exhibits ongoing and systematic support of professional development opportunities.	Exhibits support of regular professional development opportunities.	Evidence of intermittent professional development opportunities.	Minimal evidence of professional development opportunities.
Faculty Meeting Instructional Needs	Employs a sufficient number of highly qualified faculty to meet instructional needs.	Employs an adequate number of qualified faculty to meet instructional needs.	Has a plan to employ an adequate number of qualified faculty to meet instructional needs.	Faculty numbers and/or qualifications are insufficient to meet instructional needs.
Facilities and Equipment	Facilities and resources meet current and future needs.	Facilities and resources meet current needs.	Evidence of a plan to have facilities and resources meet current and future needs.	Minimal evidence that facilities and resources meet current and future needs.
4—Effectiveness				
Student Learning Outcomes Assessment	Exhibits ongoing and systematic SLO assessment to adjust instruction.	Exhibits student learning outcomes assessment and uses results to change instruction.	Has a plan to engage in ongoing and systematic SLO assessment, including using results to change instruction.	Minimal evidence of SLO assessment.

Student Success	Thoroughly analyzes trends in enrollment, degrees awarded, time-to-completion rates, and formulates comprehensive plans to address them.	Describes trends in enrollment, degrees awarded, time-to-completion rates, and formulates plans to address them.	Describes trends in enrollment, degrees awarded, time-to-completion rates, and makes an attempt to plan to address them.	Minimal description of trends and/or fails to formulate plan to address them.
5—Budget	Financial resources meet current needs and are projected to meet future needs.	Financial resources meet current needs.	Evidence of a plan to acquire financial resources to meet current needs.	Minimal evidence that financial resources meet current needs.
6—Strengths and Weaknesses	Strengths and weaknesses are described accurately and thoroughly.	Most strengths and weaknesses are described accurately and thoroughly.	Some strengths and weaknesses are described accurately and thoroughly.	Minimal evidence that strengths and weaknesses are described accurately and thoroughly.
7—New Goals and Plan	Multiyear planning process with evidence of use of assessment data in planning.	Multiyear planning process with some assessment data.	Short-term planning process recently implemented.	Minimal evidence of planning process.
8—Overall Evaluation	Evidence of ongoing systematic use of planning in selection of programs and services.	Exhibits evidence that planning guides program and services selection that supports the college.	There is evidence that planning intermittently informs some selection of services to support the college.	Minimal evidence that plans inform selection the of services to support the college.
	Highly Developed	**Developed**	**Emerging**	**Initial**