Curriculum Committee Meeting Agenda

Voting Committee Members

Chair – Kristen Booth (Pre-College)
Vice Chair – Todd Meislahn (Business)

Tyson Aldrich (Tech/Trade)
Andrea Chrisman (Science)
jessamyn duckwall (Art/Com)
John Evans (Math)
Anne Kelly (Inst Dean/Dir)
Mimi Pentz (Nurs/Hlth Occ)
Stephen Shwiff (Soc Sci/Ed)

Non-Voting Committee Members

Jarett Gilbert (VP Instructional Services)
Susan Lewis (Curriculum)
Cat Graham (Student Services)

Support Staff
Sara Wade (Instructional Services)

Guests
Lindsey Hegemann, Robert Wells-Clark

November 6, 2025 3:30 – 5:00 pm
The Dalles Campus, room 1.162 (Board Room, Building 1 next to cafe)
Join Zoom Meeting: https://cgcc.zoom.us/j/89675227929 (members are requested to turn their cameras on)

Approval of Minutes from October 23, 2025 [1]

Old Business:

1. Revised curriculum submission format – continued from 10.09.25 (postponed – pending action item **Susan and Kristen will bring examples to a future meeting for further discussion and approval of this new process.)
2. Inclusion of successful completion of the Aviation Licensure Exams as part of degree requirements (postponed – pending action item ** Tyson will research how this is done at other colleges. The committee asked that he specifically look at community colleges doing this practice and bring to the committee what he finds at a later meeting.)

Submissions [2]

1. Robert Wells-Clark, Lindsey Hegemann (3:40 – 4:30 pm)
    - MFG 130 Fused Deposition Modeling Additive Manufacturing (New CTE Course)
    - MFG 131 SLA / LCD / DLP Additive Manufacturing (New CTE Course)
    - MFG 132 SLS and Polymer Powder Bed Fusion Additive Manufacturing (New CTE Course)
    - MFG 240 Design for Additive Manufacturing (New CTE Course)
    - MFG 241 Prototyping and Production using Additive Methods (New CTE Course)
    - MFG 242 Prototyping and Production using Additive Methods (New CTE Course)
    - MFG 250 Metal Additive Manufacturing 1 (New CTE Course)
    - MFG 251 Metal Additive Manufacturing 2 (New CTE Course)
    - MFG 252 Metal Additive Manufacturing 3 (New CTE Course)
    - MFG 260 Metrology for Additive Manufacturing (New CTE Course)
    - MFG 261 Iterative Production Manufacturing for Additive Manufacturing (New CTE Course)
    - MFG 262 Multi-Process and Production Additive Manufacturing (New CTE Course)
    - Additive Manufacturing Processes (New Certificate)

- CNC and Additive Manufacturing AAS (New Degree)
- Fabrication and Additive Manufacturing AAS (New Degree)

New Business

1. none

Discussion Items

1. none

Next Meeting: November 20, 2025

Attachments: [1] October 23, 2025 Minutes; [2] Submissions: 12 New CTE Courses, 1 New Certificate, 2 New Degrees

Curriculum Committee Minutes
Thursday, October 23, 2025
Location: TDC Boardroom 1.162& Zoom

PRESENT:

Voting Committee Members

Chair- Kristen Booth (Pre-College)
Vice Chair - Todd Meislahn (Busines)
Mimi Pentz (Nursing/Health)
jessamyn duckwall (Art,Cult,Comm)
Anne Kelly (Sub-Inst Dean)
Tyson Aldrich (Tech/Trade)
Stephen Shwiff (Social Science)
Andrea Chrisman (Science)
John Evans (Math)

Non-Voting Members

Jarett Gilbert (VP Instructional Services)
Susan Lewis (Curriculum)
Cat Graham (Student Services)

Support Staff

Sara Wade (Instructional Services)

Guests

Sara Mustonen

Absent

Voting Members:

Non-Voting Member

Item	Discussion	Action
Call to Order: 3:33pm	**Chair Kristen Booth called the meeting to order at 3:33pm**	
Approval of October 9, 2025 Minutes	**Motion: approve as amended to fix the end time from 4:30 to 4:32pm in the "Meeting Adjourned" section of the minutes.**	Motion: Anne 2nds: Mimi 8 in favor – 0 opposed – 0 abstains
Submissions:		
CH 121 General Chemistry I (Course Revision: title, txt/mat)	Revision was made to respond to HECC concerns about having the same titles as the CCN series of CH courses. HECC has asked us to change our lower level courses to a different title to avoid confusion for students.	Motion: Mimi 2nds: Kristen 8 in favor – 0 opposed – 0 abstains

	Questioned that all the general Chemistry Courses have the same title. Are only differentiated by their course numbers. Rob chose to match the naming at OSU. Text and materials were updated to meet CC guidelines. The CC requested that the Chemistry OpenStax reference include a link to support instructors. **Motion: approve, with amendment having the department include/provide a link to OpenStax resources.**	
CH 122 General Chemistry II (Course Revision: title, txt/mat)	**Motion: approve, with amendment having the department include/provide a link to OpenStax resources.**	Motion: Kristen 2nds: Mimi 8 in favor – 0 opposed – 0 abstains
CH 123 General Chemistry III (Course Revision: title, txt/mat)	**Motion: approve, with amendment having the department include/provide a link to OpenStax resources.**	Motion: Kristen 2nds: Todd 8 in favor – 0 opposed – 1 abstains
Paramedic AAS – Modified Degree/Certificate Revision (Course title)	**Motion: approve as written.**	Motion: Anne 2nds: Todd 9 in favor – 0 opposed – 0 abstains
New Business:		
New CPL Administrative Rule • AR 040.***,*** - Credit for Prior Learning – General	This is the first of several CPL ARs coming to the committee for approval. Student Services has been already using the guidelines within the AR and it is working. The 66% of degree and certificate limitation is working well for students, according to the registrar. Once this AR is approved by the Curriculum Committee, it will move to Leadership Council (LC) to be approved and given a number by the President's Office, i.e. Tiffany Prince. Brief clarification for AMT certificates and concern that students may not be able to apply all of their CPL award for the Airframe or Powerplant certificates, which are both 69 credits. Noted that these calculations were reviewed when the committee approved the CPL credit restriction last spring. Forthcoming ARs include: Portfolio and Challenge Exams. **Motion: approve as written.**	Motion: Anne 2nds: Mimi 9 in favor – 0 opposed – 0 abstains

Discussion Items:		
1. Inclusion of successful completion of the Aviation Licensure Exams as part of degree reequipments	The Aviation Department would like to propose that for students to be awarded the Aviation Maintenance Technology AAS, they would have to complete and pass the FAA licensure exam first. The department proposes that this would ensure program integrity and maintain the value of the degree, as well as align with industry. **Reasons for:** • The FAA Airframe & Powerplant license is required for employment in Aviation Maintence • Currently there are students that have completed their degrees at CGCC but have yet completed the FAA licensure, which has to be taken within two years (24 months) of completing a program. • Tyson & Bryan have concern that by issuing degrees without licensure attainment the credibility of the program could be undermined, and that students may think when they graduate when the AAS, they are ready to enter the workforce. • By making this change it would help protect the program and student's investment by ensuring that all CGCC AMT graduates are ready and fully qualified to enter the workforce. • Concern that graduates believe that they may work on their personal aircraft because they have the AAS. • On its own, the AAS doesn't have any recognized value for working in the field. Graduates must still obtain their license. **Further Discussion:** • It was asked for clarification on what the difference is between *sitting for* rather than *passing* the FAA exams. Tyson explained that currently the program cannot guarantee passage, only that students are prepared and eligible to test. • Data from program cohorts: o **First cohort (12 students):** 10 earned the AAS; 6 took and passed FAA exams; 4 did not test o **Second cohort (5 students):** 3 fully licensed; 1 in progress; 1 did not continue.	

	Current cohort (12 students): 9 already hold airframe certification, currently completing powerplant training. - All who have attempted the FAA exams have passed. - It was asked whether this was needed, as very few students have expressed upset or confusion about degree expectations and requirements. - Compared to a few of CGCCs other CTE programs, i.e. Nursing and Medical assisting which don't require the licensure for degree awarding. But students still have to pass the licensure exam to be able to work in the field. - Cat expressed concern that the change might create logistical barriers, leaving students with completed coursework but no degree due to external testing requirements beyond CGCC's control. - And another question raised operational questions about how the college would verify licensure for the registrar and whether this process fits within community college practices. - Still uncertain how to include licensure testing as a required component of the degree, and how it would be submitted to the committee for approval. **ACTION ITEM: Tyson will research how this is done at other colleges. The committee asked that he specifically look at community colleges doing this practice and bring to the committee what he finds at a later meeting.	
2. BAS in Elementary Education submission update	Susan shared an update on the progress of the BAS in Education. The Curriculum Committee can expect to be asked to review the submissions at the November 20th meeting. - CGCC just completed and turned in Phase 2 (Notice of Application) to the state and has begun working on Phase 3. The full application is scheduled for submission on January 2nd. All Curriculum Committee and Board approvals have to be completed before it is submitted to the state. - Curriculum Committee members should anticipate and prepare for reviewing upper-division (300-400 level) coursework, when reviewing and approving the BAS.	

	• Susan wants to warn and make the committee aware that the BAS submissions will not look like the submissions that they are used to approving. • The committee was asked whether they would be willing to review submissions that didn't have content sections organized by outcomes, or possibly didn't have content sections completed at all. They may come with only descriptions and outcomes. The committee agreed that they could review the submissions if that was provided.	
Meeting Adjourned: 4:54pm	**All in favor, Chair Kristen closed the meeting at 4:54pm**	**Next Meeting: November 6, 2025**

CC date 11.5.25
CC decision _____
CC vote _____

Columbia Gorge Community College

New Course
Career Technical Education (CTE)

(Double click on check boxes to activate dialog box)

SECTION #1 GENERAL INFORMATION				
Department:	Tech & Trades: Manufacturing		Submitter name: Phone: Email:	Robert Wells-Clark 541-514-1589 rclark@cgcc.edu
Prefix and Course Number:	MFG 130		Credits:	3
Course Title: (75 characters max, including spaces)	Fused Deposition Modeling Additive Manufacturing			
May this course be repeated for credit?	☐ Yes ☒ No	For how many times?	Contact hours:	Lecture: 0 Lec/lab: 66 Lab: 0
Is this course equivalent to another? They must have the same description, outcomes and credit.			☐ Yes ☒ No	Prefix, number and title:
Reason for the new course.	Requirement for new Additive Manufacturing certificate and related degrees.			

GRADE OPTIONS: Check as many or as few options as you'd like. **Choose the default grade option**. The default grade refers to the option that is listed at the top of the dropdown menu for the CRN. Students who do not make a choice or do not make a change in the dropdown menu will automatically be assigned to the default grade option.

	Check all that apply	Default (Choose one)
A-F (letter grade)	☒	☒
Pass/No pass	☒	☐
Audit in consultation with faculty	☒	☐

REQUISITES: Identify prerequisite, corequisite and concurrent course(s)

☐ placement into:	☐ placement into:		
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co

COURSE DESCRIPTION: To be used in the catalog and schedule of classes. Begin each sentence of the course description with an active verb. Avoid using the phrases: "This course will …" and/or "Students will ..." Include course requisites in the description. Guidelines for writing concise descriptions can be found at Writing Course Descriptions.

Familiarizes students with Fused Deposition Modeling (FDM) 3D printers: their functions, relevant design applications, choosing between and working with a variety of FDM materials, performing root cause analysis for print failures, and developing design solutions to enable successful and repeatable print programs and filament profiles. Introduces FDM printer hardware, maintenance, and subcategories of FDM printer motion systems. Includes how to identify and fix common hardware and software issues, and how FDM printer technology has changed and improved over time. Audit available.

LEARNING OUTCOMES: Describe what the student will be able to do "out there" (in their life roles as worker, family member, community citizen, global citizen or lifelong learners). Outcomes must be measurable through the application of direct and/or indirect assessment strategies. Three to six outcomes are recommended. Start each outcome with an active verb, completing the sentence starter provided. (See Writing Learning Outcomes on the curriculum website.)

Outcomes: (Use observable and measurable verbs)	Upon successful completion of this course, students will be able to: 1. Identify models with geometry and production requirements best suited to FDM manufacturing techniques. 2. Demonstrate appropriate machine operation, maintenance, and safe material handling. 3. Measure FDM printed parts and modify printing parameters to meet tolerance specification. 4. Calculate ideal printing settings for different part applications and production speeds. 5. Apply g-code as it relates to FDM 3d printing.
Outcomes assessment strategies:	Department recommended assessment strategies: • Lecture and in-lab coaching and direct instruction. • Full class demonstration of skills. • Written exams. • Student proficiency through demonstration of learned strategies and skills in industry standard environments. • Job readiness based on performance. • In class lab experiments and testing using the scientific process with written result reporting.

COURSE CONTENT, ACTIVITIES AND DESIGN

Activity & Design: The determination of teaching strategies used in the delivery of outcomes is generally left to the discretion of the instructor. On occasion, a department may decide that the inclusion of a particular strategy will be required (specify in "required activities" box below). For example, a department may determine that a course will be required to incorporate a service learning project into its curriculum delivery. However, for the most part, delivery mechanisms fall under academic freedom and so the individuality and creativity of each instructor.

Here are some strategies that you might consider when designing your course: lecture, small group/forum discussion, flipped classroom, dyads, oral presentation, role play, simulation scenarios, group projects, service learning projects, hands-on lab, peer review/workshops, cooperative learning (jigsaw, fishbowl), inquiry-based instruction, differentiated instruction (learning centers), graphic organizers, etc.

Department required course activities (optional)	Cooperative learning, lecture-lab based experiential learning, guided learning pathways, peer review, hands-on lab, simulation, simulation scenarios, oral presentations.
Course Content – organized by outcomes (list each outcome followed by an outline of the related content)	**Outcome #1:** Identify models with geometry and production requirements best suited to FDM manufacturing techniques. • Filament properties and choices • Interface Material Properties • Cavities • Overhangs

	● Z axis tear optimization ● Specifications and end-user requirements to ● Choosing FDM over other processes **Outcome #2:** Demonstrate appropriate machine operation, maintenance, and safe material handling. ● Fix Extruder ● Nozzle swapping ● PTFE Tubing ● Belt replacements ● Servo Replacements ● Drying filament ● Storing filament ● Respool filament ● Preparation for printing ● Preventative maintenance ● Data Preparation **Outcome #3:** Measure FDM printed parts and modify printing parameters to meet tolerance specification ● Precision measuring for FDM ● Printing slicer / software changes for accuracy ● Data preparation for FDM ● Analysis of print data for better results ● Calibration techniques for different parameters ● Successful tolerance geometry **Outcome #4:** Calculate ideal printing settings for different part applications and production speeds ● Using the iterative process identify print problems ● Generate appropriate calibration prints to minimize material waste when creating print profiles ● Optimize calibrations to create efficiency in print parameter creation ● Consider print parameters and how they relate to production speed and the tradeoffs to be taken in to account as these changes are made **Outcome #5:** Apply g-code as it relates to FDM 3d printing ● G-Code Functions ● M-Code Functions ● Useful code modifications and hand coding ● Similarities in coding between different CNC equipment ● Differences in coding between different CNC equipment
Suggested Texts & Materials (specify if any texts or materials are required)	Use of listed Texts/Materials is not required unless so noted. • EOS Ignite Design for Additive Manufacturing • EOS Ignite Data Preparation • EOS Additive Academy Safety • Materials Properties for 3d Printing

	• Blender 3d Modeling Manual • 3d Part Generation Principles • Additive Manufacturing of Metal Parts • Additive Manufacturing Fundamentals • Stratasys E-Book on AM • https://www.ntop.com/resources/blog/what-is-design-for-additive-manufacturing/
Department Notes (optional)	Safety glasses are required at all times in the manufacturing lab, and are provided for students. Students may also purchase their own safety glasses from a local supplier. Long pants and closed toed shoes are required in the manufacturing labs at all times. Appropriate clothing must be worn to work in the lab (no synthetic materials, ect.). Safety requirements are covered prior to work in the lab.

SECTION #2 FUNCTION OF COURSE WITHIN EXISTING AND/OR NEW PROGRAM(S)		
New CTE courses must be attached to a degree and/or certificate. They cannot be offered until the degree or certificate is approved. Please answer below, as appropriate.		
Will this new course be part of existing, currently approved CGCC certificate(s) and/or degree(s)?		☒ Yes ☐ No
Name of certificate(s):		# credit:
Name of degree(s):		# credit:
Will this new course be part of a new, proposed CGCC certificate or degree?		☒ Yes ☐ No
Name of new certificate(s):	Additive Manufacturing Processes	# credit: 36
Name of new degree(s):	CNC and Additive Manufacturing Fabrication and Additive Manufacturing	# credit: 92, 96
Briefly explain how this course fits into the new or existing degrees /certificates noted above (i.e. requirement or elective):	requirement	
Is this course used to supply related instruction for a certificate?		☐ Yes ☒ No
If **yes,** the related instruction form, available on the curriculum office website, must be completed and submitted together with this form.		

SECTION #3 ADDITIONAL INFORMATION FOR NEW CTE COURSES	
Transferability: Will this course transfer to another academic institution? Identify and describe the nature of the transfer.	no
IMPACT ON OTHER PROGRAMS AND DEPARTMENTS	
Are there degrees and/or certificates that are affected by the instruction of this course? If so, provide details.	no

Are there similar courses existing in other programs or disciplines at CGCC? If yes, provide details and/or describe the nature of acknowledgments and/or agreements that have been reached.	no
Is there any potential impact on another department? Identify and consult with Department chairs whose courses may be impacted by this course, such as: content overlap, course duplication, prerequisite need, enrollment increase or decrease, etc.	☐ Yes ☒ No
Explain and/or describe the nature of acknowledgments and/or agreements that have been reached.	n/a
Has the Library director been notified regarding the addition of this course and the need for any potential resources?	☒ Yes – date: 10.27.25 ☐ No
Implementation term:	☒ Start of next academic year (summer term) ☐ Specific term (if BEFORE next academic year):
Course approval is dependent on approval of the related certificate/degree submission which documents the placement of the new course. Degree/certificate status will impact the speed of the process. The Curriculum Office will notify the submitter, department chair, and department director when the course has completed the approval process and is available to be scheduled. Curriculum changes generally go into effect at the beginning of the next academic year (summer term). Mid-year revisions/additions are discouraged but accommodated when possible if there is a specific, identifiable need.	

SECTION #4 DEPARTMENT REVIEW

"I vouch that this submission has been reviewed by the affiliated department chair and department dean/director and that they have given initial authorization for this submission. I am requesting that it be placed on the next Curriculum Committee agenda with available time slots. I understand that I am required to complete and submit, prior to the day my submission is reviewed by the Curriculum Committee, a Course Signature Form signed by the department chair and dean/director."

Submitter	Email	Date
Robert Wells-Clark	rclark@cgcc.edu	10.28.25
Department Chair (enter name of department chair): Jim Pytel		
Department Dean/Director (enter name of department dean/director): Jarett Gilbert		

NEXT STEPS:

1. Save this document as the course prefix and number (e.g. MTH 65 or HST 104). Send completed form electronically to curriculum@cgcc.edu or slewis@cgcc.edu.
2. Refer to the curriculum office website for the Curriculum Committee meeting schedule and submission deadlines. You are encouraged to send submissions prior to the deadline so that the curriculum office may review and provide feedback.
3. Submissions will be placed on the next CC agenda with available time slots, and you will be notified of your submission's estimated time for review. The Curriculum Office will send a signature page to your

CC date 11.5.25
CC decision _____
CC vote _____

Columbia Gorge Community College

New Course
Career Technical Education (CTE)

(Double click on check boxes to activate dialog box)

SECTION #1 GENERAL INFORMATION				
Department:	Tech & Trades: Manufacturing		Submitter name: Phone: Email:	Robert Wells-Clark 541-514-1589 rclark@cgcc.edu
Prefix and Course Number:	MFG 131		Credits:	3
Course Title: (75 characters max, including spaces)	SLA / LCD / DLP Additive Manufacturing			
May this course be repeated for credit?	☐ Yes ☒ No	For how many times?	Contact hours:	Lecture: 0 Lec/lab: 66 Lab: 0
Is this course equivalent to another? They must have the same description, outcomes and credit.			☐ Yes ☒ No	Prefix, number and title:
Reason for the new course.	Requirement for new Additive Manufacturing certificate and related degrees.			

GRADE OPTIONS: Check as many or as few options as you'd like. **Choose the default grade option**. The default grade refers to the option that is listed at the top of the dropdown menu for the CRN. Students who do not make a choice or do not make a change in the dropdown menu will automatically be assigned to the default grade option.

	Check all that apply	Default (Choose one)
A-F (letter grade)	☒	☒
Pass/No pass	☒	☐
Audit in consultation with faculty	☒	☐

REQUISITES: Identify prerequisite, corequisite and concurrent course(s)

☐ placement into:	☐ placement into:		
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
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course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co

COURSE DESCRIPTION: To be used in the catalog and schedule of classes. Begin each sentence of the course description with an active verb. Avoid using the phrases: "This course will …" and/or "Students will ..." Include course requisites in the description. Guidelines for writing concise descriptions can be found at Writing Course Descriptions.

Familiarizes students with Stereolithography Apparatus (SLA) 3D printers; their functions, relevant design applications, choosing between and working with a variety of SLA materials, performing root cause analysis for print failures, and designing successful and repeatable print G-Code for different materials. Introduces SLA printer hardware, maintenance, and common subcategories of SLA printer UV light generation systems. Includes how to identify and fix common hardware and software issues, and how SLA printer technology has changed and improved over time. Focuses on post processing printed parts and safe material handling. Audit available.

LEARNING OUTCOMES: Describe what the student will be able to do "out there" (in their life roles as worker, family member, community citizen, global citizen or lifelong learners). Outcomes must be measurable through the application of direct and/or indirect assessment strategies. Three to six outcomes are recommended. Start each outcome with an active verb, completing the sentence starter provided. (See Writing Learning Outcomes on the curriculum website.)

Outcomes: (Use observable and measurable verbs)	Upon successful completion of this course, students will be able to: 1. Identify models with geometry and production requirements best suited to SLA manufacturing techniques. 2. Demonstrate appropriate machine operation and maintenance. 3. Measure SLA printed parts and modify printing parameters to meet tolerance specification. 4. Calculate ideal UV exposure settings for different layer heights and different materials. 5. Apply safe material, part and waste handling as related to SLA printing
Outcomes assessment strategies:	Department recommended assessment strategies: • Lecture and in-lab coaching and direct instruction. • Full class demonstration of skills. • Written exams. • Student proficiency through demonstration of learned strategies and skills in industry standard environments. • Job readiness based on performance. • In class lab experiments and testing using the scientific process with written result reporting.

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Department required course activities (optional)	Cooperative learning, lecture-lab based experiential learning, guided learning pathways, peer review, hands-on lab, simulation, simulation scenarios, oral presentations.
Course Content – organized by outcomes (list each outcome followed by an outline of the related content)	**Outcome #1:** Identify models with geometry and production requirements best suited to SLA manufacturing techniques. • Resin type properties and choices • Cavities • Overhangs • Z axis tear optimization • Read blueprints for AM

	● Specifications and end-user requirements to ● Choosing SLA vs. other processes **Outcome #2:** Demonstrate appropriate machine operation and maintenance. ● SLA specific slicing ● SLA software usage ● SLA support structure programming ● SLA machine and motion assembly maintenance ● First exposure plate caretaking, repair and replacement ● Exposure LCD repair and replacement **Outcome #3:** Measure SLA printed parts and modify printing parameters to meet tolerance specification. ● Measuring and measuring tools for SLA printing ● Printing slicer / software changes for accuracy ● Data preparation for SLA ● Analysis of data for SLA ● Calibration strategies ● Tolerances and how to achieve them **Outcome #4:** Calculate ideal UV exposure settings for different layer heights and different materials. ● UV Exposure modifications ● Resolution determination and reasons ● Resin dependent exposures ● Strategies for success in different geometries ● Layer height cost and ROI analysis **Outcome #5:** Apply safe material, part and waste handling as related to SLA printing ● Resin handling ● Resin cleaning and use ● Resin disposal techniques ● Resin preparations and storage ● Machine maintenance for SLA ● Learn of the risks associated with UV activated resins and how they may impact skin and lungs ● Practice use of proper PPE including chemical-resistant gloves and respirators ● Plan ahead to prevent mess when interacting with resin. ● Ensure finished parts are fully cured and safe to handle ● Properly dispose of resin waste by ensuring it cures before going in the trash and doesn't get poured into drains

Suggested Texts & Materials (specify if any texts or materials are required)	Use of listed Texts/Materials is not required unless so noted. • EOS Ignite Design for Additive Manufacturing • EOS Ignite Data Preparation • EOS Additive Academy Safety • Materials Properties for 3d Printing • Blender 3d Modeling Manual • 3d Part Generation Principles • Additive Manufacturing of Metal Parts • Additive Manufacturing Fundamentals • Stratasys E-Book on AM • https://www.ntop.com/resources/blog/what-is-design-for-additive-manufacturing/
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Name of certificate(s):		# credit:
Name of degree(s):		# credit:
Will this new course be part of a new, proposed CGCC certificate or degree?		☒ Yes ☐ No
Name of new certificate(s):	Additive Manufacturing Processes	# credit: 36
Name of new degree(s):	CNC and Additive Manufacturing Fabrication and Additive Manufacturing	# credit: 92, 96
Briefly explain how this course fits into the new or existing degrees /certificates noted above (i.e. requirement or elective):	requirement	
Is this course used to supply related instruction for a certificate?		☐ Yes ☒ No
If **yes,** the related instruction form, available on the curriculum office website, must be completed and submitted together with this form.		

SECTION #3 ADDITIONAL INFORMATION FOR NEW CTE COURSES	
Transferability: Will this course transfer to another academic institution? Identify and describe the nature of the transfer.	no

IMPACT ON OTHER PROGRAMS AND DEPARTMENTS	
Are there degrees and/or certificates that are affected by the instruction of this course? If so, provide details.	no
Are there similar courses existing in other programs or disciplines at CGCC? If yes, provide details and/or describe the nature of acknowledgments and/or agreements that have been reached.	no
Is there any potential impact on another department? Identify and consult with Department chairs whose courses may be impacted by this course, such as: content overlap, course duplication, prerequisite need, enrollment increase or decrease, etc.	☐ Yes ☒ No
Explain and/or describe the nature of acknowledgments and/or agreements that have been reached.	n/a
Has the Library director been notified regarding the addition of this course and the need for any potential resources?	☒ Yes – date: 10.27.25 ☐ No
Implementation term:	☒ Start of next academic year (summer term) ☐ Specific term (if BEFORE next academic year):
Course approval is dependent on approval of the related certificate/degree submission which documents the placement of the new course. Degree/certificate status will impact the speed of the process. The Curriculum Office will notify the submitter, department chair, and department director when the course has completed the approval process and is available to be scheduled. Curriculum changes generally go into effect at the beginning of the next academic year (summer term). Mid-year revisions/additions are discouraged but accommodated when possible if there is a specific, identifiable need.	

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Submitter	Email	Date
Robert Wells-Clark	rclark@cgcc.edu	10.28.25
Department Chair (enter name of department chair): Jim Pytel		
Department Dean/Director (enter name of department dean/director): Jarett Gilbert		

NEXT STEPS:

CC date 11.5.25
CC decision _____
CC vote _____

Columbia Gorge Community College

New Course
Career Technical Education (CTE)

(Double click on check boxes to activate dialog box)

SECTION #1 GENERAL INFORMATION				
Department:	Tech & Trades: Manufacturing		Submitter name: Phone: Email:	Robert Wells-Clark 541-514-1589 rclark@cgcc.edu
Prefix and Course Number:	MFG 132		Credits:	3
Course Title: (75 characters max, including spaces)	SLS and Polymer Powder Bed Fusion Additive Manufacturing			
May this course be repeated for credit?	☐ Yes ☒ No	For how many times?	Contact hours:	Lecture: 0 Lec/lab: 66 Lab: 0
Is this course equivalent to another? They must have the same description, outcomes and credit.			☐ Yes ☒ No	Prefix, number and title:
Reason for the new course.	Requirement for new Additive Manufacturing certificate and related degrees.			

GRADE OPTIONS: Check as many or as few options as you'd like. **Choose the default grade option**. The default grade refers to the option that is listed at the top of the dropdown menu for the CRN. Students who do not make a choice or do not make a change in the dropdown menu will automatically be assigned to the default grade option.

	Check all that apply	Default (Choose one)
A-F (letter grade)	☒	☒
Pass/No pass	☒	☐
Audit in consultation with faculty	☒	☐

REQUISITES: Identify prerequisite, corequisite and concurrent course(s)

☐ placement into:	☐ placement into:		
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co

COURSE DESCRIPTION: To be used in the catalog and schedule of classes. Begin each sentence of the course description with an active verb. Avoid using the phrases: "This course will …" and/or "Students will ..." Include course requisites in the description. Guidelines for writing concise descriptions can be found at Writing Course Descriptions.

Familiarizes students with Selective Laser Sintering (SLS) 3D printers; their functions, relevant design applications, choosing between and working with a variety of SLS materials, identifying reasons for print failures, and designing successful and repeatable print programs. Introduces SLS printer hardware, maintenance, and common subcategories of SLS printer motion and laser aperture systems. Covers different types of lasers utilized for sintering polymers, how to identify and fix common hardware issues, and how SLS printer technology has changed and improved over the years. Audit available.

LEARNING OUTCOMES: Describe what the student will be able to do "out there" (in their life roles as worker, family member, community citizen, global citizen or lifelong learners). Outcomes must be measurable through the application of direct and/or indirect assessment strategies. Three to six outcomes are recommended. Start each outcome with an active verb, completing the sentence starter provided. (See Writing Learning Outcomes on the curriculum website.)	
Outcomes: (Use observable and measurable verbs)	Upon successful completion of this course, students will be able to: 1. Identify models with geometry and production requirements best suited to SLS manufacturing techniques. 2. Demonstrate appropriate machine operation and maintenance for laser-based polymer printers 3. Measure SLS printed parts and modify printing parameters to meet tolerance specification. 4. Calculate laser settings for different layer heights and different materials. 5. Apply safety and PPE requirements when handling polymer powder material.
Outcomes assessment strategies:	Department recommended assessment strategies: • Lecture and in-lab coaching and direct instruction. • Full class demonstration of skills. • Written exams. • Student proficiency through demonstration of learned strategies and skills in industry standard environments. • Job readiness based on performance. • In class lab experiments and testing using the scientific process with written result reporting.
COURSE CONTENT, ACTIVITIES AND DESIGN	
Activity & Design: The determination of teaching strategies used in the delivery of outcomes is generally left to the discretion of the instructor. On occasion, a department may decide that the inclusion of a particular strategy will be required (specify in "required activities" box below). For example, a department may determine that a course will be required to incorporate a service learning project into its curriculum delivery. However, for the most part, delivery mechanisms fall under academic freedom and so the individuality and creativity of each instructor. Here are some strategies that you might consider when designing your course: lecture, small group/forum discussion, flipped classroom, dyads, oral presentation, role play, simulation scenarios, group projects, service learning projects, hands-on lab, peer review/workshops, cooperative learning (jigsaw, fishbowl), inquiry-based instruction, differentiated instruction (learning centers), graphic organizers, etc.	
Department required course activities (optional)	Cooperative learning, lecture-lab based experiential learning, guided learning pathways, peer review, hands-on lab, simulation, simulation scenarios, oral presentations.
Course Content – organized by outcomes (list each outcome followed by an outline of the related content)	**Outcome #1:** Identify models with geometry and production requirements best suited to SLS manufacturing techniques. • Geometry for SLS printing • Exposures for SLS printing materials • SLS powders and their uses, including nylon and TPU • Production density in SLS

	Outcome #2: Demonstrate appropriate machine operation and maintenance for laser-based polymer printers ● SLS Maintenance Planning ● SLS material maintenance strategies ● Print failure root cause analysis ● Hardware, software and consumable quality analysis and action ● SLS setup and operation ● SLS Calibration techniques **Outcome #3:** Measure SLS printed parts and modify printing parameters to meet tolerance specification ● Measure SLS printed materials across appropriate geometry ● SLS printing parameters for geometry and tolerance ● Data points / gather for SLS machines' ● Layer height and powder density adjustments for SLS printing ● Print to tolerance using geometry to advantage **Outcome #4:** Calculate laser settings for different layer heights and different materials. ● Parameter modification for different materials ● Parameter modification for different geometries ● Layer heights and their effectiveness ● Settings and parameter calibration for different materials ● Math for SLS printing parameters ● Math for geometrical accuracy across layer height **Outcome #5:** Apply safety and PPE requirements when handling polymer powder material. ● Powder refresh rate ● Print cleaning ● Print post processing ● Powder cleaning and mixing ● PPE for SLS ● PPE for powder handling ● Powder handling equipment' ● Polymer powder pre-processing ● Polymer powder reprocessing ● Powder quality analysis
Suggested Texts & Materials (specify if any texts or materials are required)	Use of listed Texts/Materials is not required unless so noted. • EOS Ignite Design for Additive Manufacturing • EOS Ignite Data Preparation • EOS Additive Academy Safety

	• Materials Properties for 3d Printing • Blender 3d Modeling Manual • 3d Part Generation Principles • Additive Manufacturing of Metal Parts • Additive Manufacturing Fundamentals • Stratasys E-Book on AM • https://www.ntop.com/resources/blog/what-is-design-for-additive-manufacturing/
Department Notes (optional)	Safety glasses are required at all times in the manufacturing lab, and are provided for students. Students may also purchase their own safety glasses from a local supplier. Long pants and closed toed shoes are required in the manufacturing labs at all times. Appropriate clothing must be worn to work in the lab (no synthetic materials, ect.). Safety requirements are covered prior to work in the lab.

SECTION #2 FUNCTION OF COURSE WITHIN EXISTING AND/OR NEW PROGRAM(S)		
New CTE courses must be attached to a degree and/or certificate. They cannot be offered until the degree or certificate is approved. Please answer below, as appropriate.		
Will this new course be part of existing, currently approved CGCC certificate(s) and/or degree(s)?		☒ Yes ☐ No
Name of certificate(s):		# credit:
Name of degree(s):		# credit:
Will this new course be part of a new, proposed CGCC certificate or degree?		☒ Yes ☐ No
Name of new certificate(s):	Additive Manufacturing Processes	# credit: 36
Name of new degree(s):	CNC and Additive Manufacturing Fabrication and Additive Manufacturing	# credit: 92, 96
Briefly explain how this course fits into the new or existing degrees /certificates noted above (i.e. requirement or elective):	requirement	
Is this course used to supply related instruction for a certificate?		☐ Yes ☒ No
If **yes,** the related instruction form, available on the curriculum office website, must be completed and submitted together with this form.		

SECTION #3 ADDITIONAL INFORMATION FOR NEW CTE COURSES	
Transferability: Will this course transfer to another academic institution? Identify and describe the nature of the transfer.	no
IMPACT ON OTHER PROGRAMS AND DEPARTMENTS	
Are there degrees and/or certificates that are affected by the instruction of this course? If so, provide details.	no

Are there similar courses existing in other programs or disciplines at CGCC? If yes, provide details and/or describe the nature of acknowledgments and/or agreements that have been reached.	no
Is there any potential impact on another department? Identify and consult with Department chairs whose courses may be impacted by this course, such as: content overlap, course duplication, prerequisite need, enrollment increase or decrease, etc.	☐ Yes ☒ No
Explain and/or describe the nature of acknowledgments and/or agreements that have been reached.	n/a
Has the Library director been notified regarding the addition of this course and the need for any potential resources?	☒ Yes – date: 10.27.25 ☐ No
Implementation term:	☒ Start of next academic year (summer term) ☐ Specific term (if BEFORE next academic year):
Course approval is dependent on approval of the related certificate/degree submission which documents the placement of the new course. Degree/certificate status will impact the speed of the process. The Curriculum Office will notify the submitter, department chair, and department director when the course has completed the approval process and is available to be scheduled. Curriculum changes generally go into effect at the beginning of the next academic year (summer term). Mid-year revisions/additions are discouraged but accommodated when possible if there is a specific, identifiable need.	

SECTION #4 DEPARTMENT REVIEW

"I vouch that this submission has been reviewed by the affiliated department chair and department dean/director and that they have given initial authorization for this submission. I am requesting that it be placed on the next Curriculum Committee agenda with available time slots. I understand that I am required to complete and submit, prior to the day my submission is reviewed by the Curriculum Committee, a Course Signature Form signed by the department chair and dean/director."

Submitter	Email	Date
Robert Wells-Clark	rclark@cgcc.edu	10.28.25
Department Chair (enter name of department chair): Jim Pytel		
Department Dean/Director (enter name of department dean/director): Jarett Gilbert		

NEXT STEPS:

1. Save this document as the course prefix and number (e.g. MTH 65 or HST 104). Send completed form electronically to curriculum@cgcc.edu or slewis@cgcc.edu.
2. Refer to the curriculum office website for the Curriculum Committee meeting schedule and submission deadlines. You are encouraged to send submissions prior to the deadline so that the curriculum office may review and provide feedback.
3. Submissions will be placed on the next CC agenda with available time slots, and you will be notified of your submission's estimated time for review. The Curriculum Office will send a signature page to your

CC date 11.5.25
CC decision _____
CC vote _____

Columbia Gorge Community College

New Course
Career Technical Education (CTE)

(Double click on check boxes to activate dialog box)

SECTION #1 GENERAL INFORMATION				
Department:	Tech & Trades: Manufacturing		Submitter name: Phone: Email:	Robert Wells-Clark 541-514-1589 rclark@cgcc.edu
Prefix and Course Number:	MFG 240		Credits:	3
Course Title: (75 characters max, including spaces)	Design for Additive Manufacturing			
May this course be repeated for credit?	☐ Yes ☒ No	For how many times?	Contact hours:	Lecture: 0 Lec/lab: 66 Lab: 0
Is this course equivalent to another? They must have the same description, outcomes and credit.			☐ Yes ☒ No	Prefix, number and title:
Reason for the new course.	Requirement for new Additive Manufacturing certificate and related degrees.			

GRADE OPTIONS: Check as many or as few options as you'd like. **Choose the default grade option**. The default grade refers to the option that is listed at the top of the dropdown menu for the CRN. Students who do not make a choice or do not make a change in the dropdown menu will automatically be assigned to the default grade option.

	Check all that apply	Default (Choose one)
A-F (letter grade)	☒	☒
Pass/No pass	☒	☐
Audit in consultation with faculty	☒	☐

REQUISITES: Identify prerequisite, corequisite and concurrent course(s)

☐ placement into:	☐ placement into:		
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co

COURSE DESCRIPTION: To be used in the catalog and schedule of classes. Begin each sentence of the course description with an active verb. Avoid using the phrases: "This course will …" and/or "Students will ..." Include course requisites in the description. Guidelines for writing concise descriptions can be found at Writing Course Descriptions.

Trains the skills needed to navigate and design in a digital 3D space (Computer Aided Design, CAD), and to ensure effective usage of computer technology that is essential to additive manufacturing (AM). Focuses on pathways to creation of parts for AM; a deviation from traditional CAD workflows. Audit available.

LEARNING OUTCOMES: Describe what the student will be able to do "out there" (in their life roles as worker, family member, community citizen, global citizen or lifelong learners). Outcomes must be measurable through the application of direct and/or indirect assessment strategies. Three to six outcomes are recommended. Start each outcome with an active verb, completing the sentence starter provided. (See Writing Learning Outcomes on the curriculum website.)

Outcomes: (Use observable and measurable verbs)	Upon successful completion of this course, students will be able to: 1. Utilize CAD software to analyze and prepare models and model features for additive manufacturing processing. 2. Assess model structure, material properties, and orientations for additive manufacturing. 3. Summarize the fundamental differences in model preparations for additive manufacturing compared to reductive manufacturing 4. Select appropriate CAD software to be used to manipulate models to be produced in AM workflow based on model geometry. 5. Use CAD software to alter 3D models to improve their suitability for AM processes without impacting the intended use of the part.
Outcomes assessment strategies:	Department recommended assessment strategies: • Lecture and in-lab coaching and direct instruction. • Full class demonstration of skills. • Written exams. • Student proficiency through demonstration of learned strategies and skills in industry standard environments. • Job readiness based on performance. • In class lab experiments and testing using the scientific process with written result reporting.
COURSE CONTENT, ACTIVITIES AND DESIGN	
Activity & Design: The determination of teaching strategies used in the delivery of outcomes is generally left to the discretion of the instructor. On occasion, a department may decide that the inclusion of a particular strategy will be required (specify in “required activities” box below). For example, a department may determine that a course will be required to incorporate a service learning project into its curriculum delivery. However, for the most part, delivery mechanisms fall under academic freedom and so the individuality and creativity of each instructor. Here are some strategies that you might consider when designing your course: lecture, small group/forum discussion, flipped classroom, dyads, oral presentation, role play, simulation scenarios, group projects, service learning projects, hands-on lab, peer review/workshops, cooperative learning (jigsaw, fishbowl), inquiry-based instruction, differentiated instruction (learning centers), graphic organizers, etc.	
Department required course activities (optional)	Cooperative learning, lecture-lab based experiential learning, guided learning pathways, peer review, hands-on lab, simulation, simulation scenarios, oral presentations.
Course Content – organized by outcomes (list each outcome followed by an outline of the related content)	**Outcome #1:** Utilize CAD software to analyze and prepare models and model features for additive manufacturing processing. • Model for additive manufacturing • Additive process specific geometry • Modify geometry for additive. • Change challenging geometry • Create beneficial geometry • Meet design parameters with additive technology

- Process / workflow creation based on tooling availability

Outcome #2: Assess model structure, material properties, and orientations for additive manufacturing

- Geometry for metal additive
- Geometry for polymer powder additive
- Geometry for FDM additive
- Model for differing materials and end uses
- Model for production orientation
- Model for structural orientation
- Model for prototyping orientation
- Model for existing additive equipment
- Model for other facilities additive and processes equipment
- Material specific modeling for additive processes

Outcome #3: Summarize the fundamental differences in model preparations for additive manufacturing compared to reductive manufacturing

- Test model strength in real world with additive processes
- Test model strength in real world with non-additive processes
- Data capture for modification of models
- Create model that utilizes additive strengths
- Create model that utilizes reductive strengths
- Create model that exposes additive weaknesses
- Create model that exposes reductive weaknesses

Outcome #4: Select appropriate CAD software to be used to manipulate models to be produced in AM workflow based on model geometry.

- CAD software for Solid Models
- CAD software for Generative Design
- CAD software for organic shapes
- CAD software for lattices
- CAD software for additive manufacturing
- Determine CAD software for specific print modality

Outcome #5: Use CAD software to alter 3D models to improve their suitability for AM processes without impacting the intended use of the part

- Change geometry to suit metal additive, SLS, SLA or FDM printing
- Check models in end-use scenario
- Orientate datums for additive
- Change hole and fasteners to suit AM applications
- Pros and cons of changes for additive manufacturing
- Post processing as it relates to original CAD design

Suggested Texts & Materials (specify if any texts or materials are required)	Use of listed Texts/Materials is not required unless so noted. • EOS Ignite Design for Additive Manufacturing • EOS Ignite Data Preparation • EOS Additive Academy Safety • Materials Properties for 3d Printing • Blender 3d Modeling Manual • 3d Part Generation Principles • Additive Manufacturing of Metal Parts • Additive Manufacturing Fundamentals • Stratasys E-Book on AM • https://www.ntop.com/resources/blog/what-is-design-for-additive-manufacturing/
Department Notes (optional)	Safety glasses are required at all times in the manufacturing lab, and are provided for students. Students may also purchase their own safety glasses from a local supplier. Long pants and closed toed shoes are required in the manufacturing labs at all times. Appropriate clothing must be worn to work in the lab (no synthetic materials, ect.). Safety requirements are covered prior to work in the lab.

SECTION #2 FUNCTION OF COURSE WITHIN EXISTING AND/OR NEW PROGRAM(S)		
New CTE courses must be attached to a degree and/or certificate. They cannot be offered until the degree or certificate is approved. Please answer below, as appropriate.		
Will this new course be part of existing, currently approved CGCC certificate(s) and/or degree(s)?		☒ Yes ☐ No
Name of certificate(s):		# credit:
Name of degree(s):		# credit:
Will this new course be part of a new, proposed CGCC certificate or degree?		☒ Yes ☐ No
Name of new certificate(s):	Additive Manufacturing Processes	# credit: 36
Name of new degree(s):	CNC and Additive Manufacturing Fabrication and Additive Manufacturing	# credit: 92, 96
Briefly explain how this course fits into the new or existing degrees /certificates noted above (i.e. requirement or elective):	requirement	
Is this course used to supply related instruction for a certificate?		☐ Yes ☒ No
If **yes,** the related instruction form, available on the curriculum office website, must be completed and submitted together with this form.		

SECTION #3 ADDITIONAL INFORMATION FOR NEW CTE COURSES	
Transferability: Will this course transfer to another academic institution? Identify and describe the nature of the transfer.	no

IMPACT ON OTHER PROGRAMS AND DEPARTMENTS	
Are there degrees and/or certificates that are affected by the instruction of this course? If so, provide details.	no
Are there similar courses existing in other programs or disciplines at CGCC? If yes, provide details and/or describe the nature of acknowledgments and/or agreements that have been reached.	no
Is there any potential impact on another department? Identify and consult with Department chairs whose courses may be impacted by this course, such as: content overlap, course duplication, prerequisite need, enrollment increase or decrease, etc.	☐ Yes ☒ No
Explain and/or describe the nature of acknowledgments and/or agreements that have been reached.	n/a
Has the Library director been notified regarding the addition of this course and the need for any potential resources?	☒ Yes – date: 10.27.25 ☐ No
Implementation term:	☒ Start of next academic year (summer term) ☐ Specific term (if BEFORE next academic year):
Course approval is dependent on approval of the related certificate/degree submission which documents the placement of the new course. Degree/certificate status will impact the speed of the process. The Curriculum Office will notify the submitter, department chair, and department director when the course has completed the approval process and is available to be scheduled. Curriculum changes generally go into effect at the beginning of the next academic year (summer term). Mid-year revisions/additions are discouraged but accommodated when possible if there is a specific, identifiable need.	

SECTION #4 DEPARTMENT REVIEW

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Submitter	Email	Date
Robert Wells-Clark	rclark@cgcc.edu	10.28.25
Department Chair (enter name of department chair): Jim Pytel		
Department Dean/Director (enter name of department dean/director): Jarett Gilbert		

NEXT STEPS:

CC date 11.5.25
CC decision _____
CC vote _____

Columbia Gorge Community College

New Course
Career Technical Education (CTE)

(Double click on check boxes to activate dialog box)

SECTION #1 GENERAL INFORMATION				
Department:	Tech & Trades: Manufacturing		Submitter name: Phone: Email:	Robert Wells-Clark 541-514-1589 rclark@cgcc.edu
Prefix and Course Number:	MFG 241		Credits:	3
Course Title: (75 characters max, including spaces)	Prototyping and Production using Additive Methods			
May this course be repeated for credit?	☐ Yes ☒ No	For how many times?	Contact hours:	Lecture: 0 Lec/lab: 66 Lab: 0
Is this course equivalent to another? They must have the same description, outcomes and credit.			☐ Yes ☒ No	Prefix, number and title:
Reason for the new course.	Requirement for new Additive Manufacturing certificate and related degrees.			

GRADE OPTIONS: Check as many or as few options as you'd like. **Choose the default grade option**. The default grade refers to the option that is listed at the top of the dropdown menu for the CRN. Students who do not make a choice or do not make a change in the dropdown menu will automatically be assigned to the default grade option.

	Check all that apply	Default (Choose one)
A-F (letter grade)	☒	☒
Pass/No pass	☒	☐
Audit in consultation with faculty	☒	☐

REQUISITES: Identify prerequisite, corequisite and concurrent course(s)

☐ placement into:	☐ placement into:		
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co

COURSE DESCRIPTION: To be used in the catalog and schedule of classes. Begin each sentence of the course description with an active verb. Avoid using the phrases: "This course will …" and/or "Students will ..." Include course requisites in the description. Guidelines for writing concise descriptions can be found at Writing Course Descriptions.

Teaches prototyping and documentation processes: how to make prototyping more efficient in material use and time, and how to accurately and objectively assess the quality of additively manufactured parts, and identify areas to be improved upon via the iterative process. Creates skillsets to identify design priorities and needs, such as finding the best process modality, and determining jobs better suited to other methods of manufacture. Requires the application of a specific design process that is chosen and applied throughout the design and production process. Audit available.

LEARNING OUTCOMES: Describe what the student will be able to do "out there" (in their life roles as worker, family member, community citizen, global citizen or lifelong learners). Outcomes must be measurable through the application of direct and/or indirect assessment strategies. Three to six outcomes are recommended. Start each outcome with an active verb, completing the sentence starter provided. (See Writing Learning Outcomes on the curriculum website.)	
Outcomes: (Use observable and measurable verbs)	Upon successful completion of this course, students will be able to: 1. Create and document scientific processes for quality evaluation of AM components. 2. Analyze and categorize geometric compatibility of AM modalities. 3. Compare processes and identify key differences in multiple AM modalities. 4. Develop strategies for applied design using modular prototypes recording data that informs subsequent iterations. 5. Determine most appropriate process for creation of different part geometries, densities and utilizations.
Outcomes assessment strategies:	Department recommended assessment strategies: • Lecture and in-lab coaching and direct instruction. • Full class demonstration of skills. • Written exams. • Student proficiency through demonstration of learned strategies and skills in industry standard environments. • Job readiness based on performance. • In class lab experiments and testing using the scientific process with written result reporting.
COURSE CONTENT, ACTIVITIES AND DESIGN	
Activity & Design: The determination of teaching strategies used in the delivery of outcomes is generally left to the discretion of the instructor. On occasion, a department may decide that the inclusion of a particular strategy will be required (specify in "required activities" box below). For example, a department may determine that a course will be required to incorporate a service learning project into its curriculum delivery. However, for the most part, delivery mechanisms fall under academic freedom and so the individuality and creativity of each instructor. Here are some strategies that you might consider when designing your course: lecture, small group/forum discussion, flipped classroom, dyads, oral presentation, role play, simulation scenarios, group projects, service learning projects, hands-on lab, peer review/workshops, cooperative learning (jigsaw, fishbowl), inquiry-based instruction, differentiated instruction (learning centers), graphic organizers, etc.	
Department required course activities (optional)	Cooperative learning, lecture-lab based experiential learning, guided learning pathways, peer review, hands-on lab, simulation, simulation scenarios, oral presentations.
Course Content – organized by outcomes (list each outcome followed by an outline of the related content)	**Outcome #1:** Create and document scientific processes for quality evaluation of AM components. • Data collection points for consumables quality • Data collection points for build quality • Data collection for post processing • Data Analyzation • Track information over time as it relates to additive processes

	• Hypothesize solutions from data • Make changes based on data driven decision making **Outcome #2:** Analyze and categorize geometric compatibility of AM modalities. • Geometric capability testing of FDM, SLA, SLS and Metal AM • Process limitations of FDM, SLA, SLS and Metal AM • Test parts in similar materials with different processes • Result validation or data analyzation for change **Outcome #3:** Compare processes and identify key differences in multiple AM modalities. • Material deposition in FDM, SLA, SLS and Metal AM • Mechanical properties of parts in FDM, SLA, SLS and Metal AM • Advantages of FDM, SLA, SLS and Metal AM • Disadvantages of FDM, SLA, SLS and Metal AM **Outcome #4:** Develop strategies for applied design using modular prototypes recording data that informs subsequent iterations • Iterative process of similar / same geometry testing in FDM, SLA, SLS and Metal AM • Modeling change process for FDM, SLA, SLS and Metal AM • Downstream workflow effects on changes in FDM, SLA, SLS and Metal AM • Data collection for prototyping • Creation of engineered process for additive **Outcome #5:** Determine most appropriate process for creation of different part geometries, densities and utilizations • Creation process for less than dense parts in FDM, SLA, SLS and Metal AM • Creation process for dense parts in FDM, SLA, SLS and Metal AM • End use utilization and its effect on process selection • Test printed parts in FDM, SLA, SLS and Metal AM in varying densities • Test printed parts in FDM, SLA, SLS and Metal AM in varying geometrical orientations
Suggested Texts & Materials (specify if any texts or materials are required)	Use of listed Texts/Materials is not required unless so noted. • EOS Ignite Design for Additive Manufacturing • EOS Ignite Data Preparation • EOS Additive Academy Safety • Materials Properties for 3d Printing • Blender 3d Modeling Manual • 3d Part Generation Principles • Additive Manufacturing of Metal Parts • Additive Manufacturing Fundamentals • Stratasys E-Book on AM • https://www.ntop.com/resources/blog/what-is-design-for-additive-manufacturing/

Department Notes (optional)	Safety glasses are required at all times in the manufacturing lab, and are provided for students. Students may also purchase their own safety glasses from a local supplier. Long pants and closed toed shoes are required in the manufacturing labs at all times. Appropriate clothing must be worn to work in the lab (no synthetic materials, ect.). Safety requirements are covered prior to work in the lab.

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Will this new course be part of existing, currently approved CGCC certificate(s) and/or degree(s)?		☒ Yes ☐ No
Name of certificate(s):		# credit:
Name of degree(s):		# credit:
Will this new course be part of a new, proposed CGCC certificate or degree?		☒ Yes ☐ No
Name of new certificate(s):	Additive Manufacturing Processes	# credit: 36
Name of new degree(s):	CNC and Additive Manufacturing Fabrication and Additive Manufacturing	# credit: 92, 96
Briefly explain how this course fits into the new or existing degrees /certificates noted above (i.e. requirement or elective):	requirement	
Is this course used to supply related instruction for a certificate?		☐ Yes ☒ No
If **yes,** the related instruction form, available on the curriculum office website, must be completed and submitted together with this form.		

SECTION #3 ADDITIONAL INFORMATION FOR NEW CTE COURSES	
Transferability: Will this course transfer to another academic institution? Identify and describe the nature of the transfer.	no
IMPACT ON OTHER PROGRAMS AND DEPARTMENTS	
Are there degrees and/or certificates that are affected by the instruction of this course? If so, provide details.	no
Are there similar courses existing in other programs or disciplines at CGCC? If yes, provide details and/or describe the nature of acknowledgments and/or agreements that have been reached.	no

Is there any potential impact on another department? Identify and consult with Department chairs whose courses may be impacted by this course, such as: content overlap, course duplication, prerequisite need, enrollment increase or decrease, etc.	☐ Yes ☒ No
Explain and/or describe the nature of acknowledgments and/or agreements that have been reached.	n/a
Has the Library director been notified regarding the addition of this course and the need for any potential resources?	☒ Yes – date: 10.27.25 ☐ No
Implementation term:	☒ Start of next academic year (summer term) ☐ Specific term (if BEFORE next academic year):
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SECTION #4 DEPARTMENT REVIEW

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Submitter	Email	Date
Robert Wells-Clark	rclark@cgcc.edu	10.28.25
Department Chair (enter name of department chair): Jim Pytel		
Department Dean/Director (enter name of department dean/director): Jarett Gilbert		

NEXT STEPS:

1. Save this document as the course prefix and number (e.g. MTH 65 or HST 104). Send completed form electronically to curriculum@cgcc.edu or slewis@cgcc.edu.
2. Refer to the curriculum office website for the Curriculum Committee meeting schedule and submission deadlines. You are encouraged to send submissions prior to the deadline so that the curriculum office may review and provide feedback.
3. Submissions will be placed on the next CC agenda with available time slots, and you will be notified of your submission's estimated time for review. The Curriculum Office will send a signature page to your department chair and department dean/director that may be completed electronically. Signature pages must be received by the Curriculum Office the day before the Curriculum Committee meeting for which the submission is scheduled. Submissions without signed signature pages will be postponed.
4. It is not mandatory that you attend the Curriculum Committee meeting in which your submission is scheduled for review; however, it is strongly encouraged that you attend so that you may represent your submission and respond to any committee questions. Unanswered questions may result in a submission being rescheduled for further clarification.

CC date 11.5.25
CC decision _____
CC vote _____

Columbia Gorge Community College

New Course
Career Technical Education (CTE)

(Double click on check boxes to activate dialog box)

SECTION #1 GENERAL INFORMATION				
Department:	Tech & Trades: Manufacturing		Submitter name: Phone: Email:	Robert Wells-Clark 541-514-1589 rclark@cgcc.edu
Prefix and Course Number:	MFG 242		Credits:	3
Course Title: (75 characters max, including spaces)	3D Scanning and Design to Fit			
May this course be repeated for credit?	☐ Yes ☒ No	For how many times?	Contact hours:	Lecture: 0 Lec/lab: 66 Lab: 0
Is this course equivalent to another? They must have the same description, outcomes and credit.			☐ Yes ☒ No	Prefix, number and title:
Reason for the new course.	Requirement for new Additive Manufacturing certificate and related degrees.			

GRADE OPTIONS: Check as many or as few options as you'd like. **Choose the default grade option**. The default grade refers to the option that is listed at the top of the dropdown menu for the CRN. Students who do not make a choice or do not make a change in the dropdown menu will automatically be assigned to the default grade option.

	Check all that apply	Default (Choose one)
A-F (letter grade)	☒	☒
Pass/No pass	☒	☐
Audit in consultation with faculty	☒	☐

REQUISITES: Identify prerequisite, corequisite and concurrent course(s)

☐ placement into:	☐ placement into:		
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co

COURSE DESCRIPTION: To be used in the catalog and schedule of classes. Begin each sentence of the course description with an active verb. Avoid using the phrases: "This course will …" and/or "Students will ..." Include course requisites in the description. Guidelines for writing concise descriptions can be found at Writing Course Descriptions.

Builds on digital design skills by incorporating 3D scans of parts into the design workflow. Incorporates the operation of multiple kinds of scanning technology, and provides training on how each technology generates data. Includes the optimization of 3D scan data, bringing it into CAD software to reverse design parts, and/or record key datums needed when designing parts meant to fit with the scanned object. Audit available.

LEARNING OUTCOMES: Describe what the student will be able to do "out there" (in their life roles as worker, family member, community citizen, global citizen or lifelong learners). Outcomes must be measurable

<table>
<tr><td colspan="2">through the application of direct and/or indirect assessment strategies. Three to six outcomes are recommended. Start each outcome with an active verb, completing the sentence starter provided. (See Writing Learning Outcomes on the curriculum website.)</td></tr>
<tr><td rowspan="2">Outcomes: (Use observable and measurable verbs)</td><td>Upon successful completion of this course, students will be able to:</td></tr>
<tr><td>1. Use different kinds of scanning equipment and choose the right technology specific to part geometry.
2. Operate 3D scanning equipment
3. Prepare objects for accurate scanning.
4. Optimize and use 3D scan data in CAD.</td></tr>
<tr><td>Outcomes assessment strategies:</td><td>Department recommended assessment strategies:
Lecture and in-lab coaching and direct instruction.
Full class demonstration of skills.
Written exams.
Student proficiency through demonstration of learned strategies and skills in industry standard environments.
Job readiness based on performance.
In class lab experiments and testing using the scientific process with written result reporting.</td></tr>
<tr><td colspan="2">COURSE CONTENT, ACTIVITIES AND DESIGN</td></tr>
<tr><td colspan="2">Activity & Design: The determination of teaching strategies used in the delivery of outcomes is generally left to the discretion of the instructor. On occasion, a department may decide that the inclusion of a particular strategy will be required (specify in “required activities” box below). For example, a department may determine that a course will be required to incorporate a service learning project into its curriculum delivery. However, for the most part, delivery mechanisms fall under academic freedom and so the individuality and creativity of each instructor.
Here are some strategies that you might consider when designing your course: lecture, small group/forum discussion, flipped classroom, dyads, oral presentation, role play, simulation scenarios, group projects, service learning projects, hands-on lab, peer review/workshops, cooperative learning (jigsaw, fishbowl), inquiry-based instruction, differentiated instruction (learning centers), graphic organizers, etc.</td></tr>
<tr><td>Department required course activities (optional)</td><td>Cooperative learning, lecture-lab based experiential learning, guided learning pathways, peer review, hands-on lab, simulation, simulation scenarios, oral presentations.</td></tr>
<tr><td>Course Content – organized by outcomes (list each outcome followed by an outline of the related content)</td><td>Outcome #1: Use different kinds of scanning equipment work and choose the right technology specific to part geometry.
Use blue laser light scanners, identify use cases
Use light refraction scanners, identify use cases
Use Lidar based scanners, identify use cases
Part geometry determination for scanning
Part color determination for scanning
Supporting equipment, processes and procedures
Outcome #2: Operate 3D scanning equipment</td></tr>
</table>

	• Create successful scans using different types of 3d scanners • Generate successful scan data using appropriate equipment and software for different types of 3d scanners **Outcome #3:** Prepare objects for accurate scanning. • Markers • Scanning Spray • Positioners • Suspension • Rotaries • Orientation of Parts • Verify method with data cloud collection • Light control systems and settings **Outcome #4:** Optimize and use 3D scan data in CAD • Cloud point data creation • Conversion of cloud points to solid structure • Conversion of cloud points to hollow structure • Data stitching from cloud points • Data accuracy from cloud points • Cloud point data file type conversions • Math for scaling and conversions • Importing of scans to appropriate CAD software
Suggested Texts & Materials (specify if any texts or materials are required)	Use of listed Texts/Materials is not required unless so noted. • EOS Ignite Design for Additive Manufacturing • EOS Ignite Data Preparation • EOS Additive Academy Safety • Materials Properties for 3d Printing • Blender 3d Modeling Manual • 3d Part Generation Principles • Additive Manufacturing of Metal Parts • Additive Manufacturing Fundamentals • Stratasys E-Book on AM • https://www.ntop.com/resources/blog/what-is-design-for-additive-manufacturing/
Department Notes (optional)	Safety glasses are required at all times in the manufacturing lab, and are provided for students. Students may also purchase their own safety glasses from a local supplier. Long pants and closed toed shoes are required in the manufacturing labs at all times. Appropriate clothing must be worn to work in the lab (no synthetic materials, ect.). Safety requirements are covered prior to work in the lab.

SECTION #2 FUNCTION OF COURSE WITHIN EXISTING AND/OR NEW PROGRAM(S)		
New CTE courses must be attached to a degree and/or certificate. They cannot be offered until the degree or certificate is approved. Please answer below, as appropriate.		
Will this new course be part of existing, currently approved CGCC certificate(s) and/or degree(s)?		☒ Yes ☐ No
Name of certificate(s):		# credit:
Name of degree(s):		# credit:
Will this new course be part of a new, proposed CGCC certificate or degree?		☒ Yes ☐ No
Name of new certificate(s):	Additive Manufacturing Processes	# credit: 36
Name of new degree(s):	CNC and Additive Manufacturing Fabrication and Additive Manufacturing	# credit: 92, 96
Briefly explain how this course fits into the new or existing degrees /certificates noted above (i.e. requirement or elective):	requirement	
Is this course used to supply related instruction for a certificate?		☐ Yes ☒ No
If **yes,** the related instruction form, available on the curriculum office website, must be completed and submitted together with this form.		

SECTION #3 ADDITIONAL INFORMATION FOR NEW CTE COURSES	
Transferability: Will this course transfer to another academic institution? Identify and describe the nature of the transfer.	no
IMPACT ON OTHER PROGRAMS AND DEPARTMENTS	
Are there degrees and/or certificates that are affected by the instruction of this course? If so, provide details.	no
Are there similar courses existing in other programs or disciplines at CGCC? If yes, provide details and/or describe the nature of acknowledgments and/or agreements that have been reached.	no
Is there any potential impact on another department? Identify and consult with Department chairs whose courses may be impacted by this course, such as: content overlap, course duplication, prerequisite need, enrollment increase or decrease, etc.	☐ Yes ☒ No
Explain and/or describe the nature of acknowledgments and/or agreements that have been reached.	n/a

Has the Library director been notified regarding the addition of this course and the need for any potential resources?	☒ Yes – date: 10.27.25 ☐ No
Implementation term:	☒ Start of next academic year (summer term) ☐ Specific term (if BEFORE next academic year):
Course approval is dependent on approval of the related certificate/degree submission which documents the placement of the new course. Degree/certificate status will impact the speed of the process. The Curriculum Office will notify the submitter, department chair, and department director when the course has completed the approval process and is available to be scheduled. Curriculum changes generally go into effect at the beginning of the next academic year (summer term). Mid-year revisions/additions are discouraged but accommodated when possible if there is a specific, identifiable need.	

SECTION #4 DEPARTMENT REVIEW

"I vouch that this submission has been reviewed by the affiliated department chair and department dean/director and that they have given initial authorization for this submission. I am requesting that it be placed on the next Curriculum Committee agenda with available time slots. I understand that I am required to complete and submit, prior to the day my submission is reviewed by the Curriculum Committee, a Course Signature Form signed by the department chair and dean/director."

Submitter	Email	Date
Robert Wells-Clark	rclark@cgcc.edu	10.28.25
Department Chair (enter name of department chair): Jim Pytel		
Department Dean/Director (enter name of department dean/director): Jarett Gilbert		

NEXT STEPS:

1. Save this document as the course prefix and number (e.g. MTH 65 or HST 104). Send completed form electronically to curriculum@cgcc.edu or slewis@cgcc.edu.
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CC date 11.5.25
CC decision _____
CC vote _____

Columbia Gorge Community College

New Course
Career Technical Education (CTE)

(Double click on check boxes to activate dialog box)

SECTION #1 GENERAL INFORMATION				
Department:	Tech & Trades: Manufacturing		Submitter name: Phone: Email:	Robert Wells-Clark 541-514-1589 rclark@cgcc.edu
Prefix and Course Number:	MFG 250		Credits:	3
Course Title: (75 characters max, including spaces)	Metal Additive Manufacturing 1			
May this course be repeated for credit?	☐ Yes ☒ No	For how many times?	Contact hours:	Lecture: 0 Lec/lab: 66 Lab: 0
Is this course equivalent to another? They must have the same description, outcomes and credit.			☐ Yes ☒ No	Prefix, number and title:
Reason for the new course.	Requirement for new Additive Manufacturing certificate and related degrees.			

GRADE OPTIONS: Check as many or as few options as you'd like. **Choose the default grade option**. The default grade refers to the option that is listed at the top of the dropdown menu for the CRN. Students who do not make a choice or do not make a change in the dropdown menu will automatically be assigned to the default grade option.

	Check all that apply	Default (Choose one)
A-F (letter grade)	☒	☒
Pass/No pass	☒	☐
Audit in consultation with faculty	☒	☐

REQUISITES: Identify prerequisite, corequisite and concurrent course(s)

☐ placement into:	☐ placement into:		
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co

COURSE DESCRIPTION: To be used in the catalog and schedule of classes. Begin each sentence of the course description with an active verb. Avoid using the phrases: "This course will …" and/or "Students will ..." Include course requisites in the description. Guidelines for writing concise descriptions can be found at Writing Course Descriptions.

Presents key strategies for success in metal additive manufacturing. Covers the use of data preparation software, starting with simple parts that have additive-friendly geometry. Trains in the operation of DMLS machinery and safe handling and processing of the non-explosive stainless-steel powder used as the material medium. Addresses the material properties of the powder, which inform strategies used during data preparation. Covers key and required supplemental skills, such as ability to operate wire electrical discharge machining equipment and CNC mills for part removal and build plate processing. Audit available.

LEARNING OUTCOMES: Describe what the student will be able to do "out there" (in their life roles as worker, family member, community citizen, global citizen or lifelong learners). Outcomes must be measurable through the application of direct and/or indirect assessment strategies. Three to six outcomes are recommended. Start each outcome with an active verb, completing the sentence starter provided. (See Writing Learning Outcomes on the curriculum website.)	
Outcomes: (Use observable and measurable verbs)	Upon successful completion of this course, students will be able to: 1. Apply safe material handling and operating practices for metal additive manufacturing equipment relating to non-reactive powders. 2. Perform setup and operation of metal additive manufacturing equipment. 3. Program metal additive manufacturing equipment for non-reactive powder. 4. Develop strategies for warp mitigation to hold appropriate tolerance in parts printed with metal additive manufacturing equipment. 5. Develop strategies and procedures for part removal and for reconditioning of build plate for re-use. 6. Create basic costing analysis processes for printing of parts.
Outcomes assessment strategies:	Department recommended assessment strategies: • Lecture and in-lab coaching and direct instruction. • Full class demonstration of skills. • Written exams. • Student proficiency through demonstration of learned strategies and skills in industry standard environments. • Job readiness based on performance. • In class lab experiments and testing using the scientific process with written result reporting.
COURSE CONTENT, ACTIVITIES AND DESIGN	
Activity & Design: The determination of teaching strategies used in the delivery of outcomes is generally left to the discretion of the instructor. On occasion, a department may decide that the inclusion of a particular strategy will be required (specify in "required activities" box below). For example, a department may determine that a course will be required to incorporate a service learning project into its curriculum delivery. However, for the most part, delivery mechanisms fall under academic freedom and so the individuality and creativity of each instructor. Here are some strategies that you might consider when designing your course: lecture, small group/forum discussion, flipped classroom, dyads, oral presentation, role play, simulation scenarios, group projects, service learning projects, hands-on lab, peer review/workshops, cooperative learning (jigsaw, fishbowl), inquiry-based instruction, differentiated instruction (learning centers), graphic organizers, etc.	
Department required course activities (optional)	Cooperative learning, lecture-lab based experiential learning, guided learning pathways, peer review, hands-on lab, simulation, simulation scenarios, oral presentations.
Course Content – organized by outcomes (list each outcome followed by an outline of the related content)	**Outcome #1:** Apply safe material handling and operating practices for metal additive manufacturing equipment relating to non-reactive powders. • Metal powder explosiveness • Metal powder health concerns • Metal powder contamination • Metal powder MSDS and KST values analysis

	● Metal powder PPE and when to use what PPE ● Metal powder handling equipment ● Metal powder processing equipment ● Safe operation of powder processing equipment **Outcome #2:** Perform setup and operation of metal additive manufacturing equipment. ● Procedure sheets for clear build communication ● Data acquisition for relevant data points ● Machine set up parameters ● Hand tool preparation for metal printers ● Build surface preparations strategies ● Build surface quality checks and controls ● Build surface leveling processes ● Powder leveling processes ● Record appropriate data relating to machine set up **Outcome #3:** Program Metal Additive Manufacturing Equipment for non-reactive powder. ● Use software to create appropriate metal AM files ● Create geometry useful for metal AM ● Support structure generation and iteration ● Powder removal program techniques ● Post processing with preprocess controls ● Geometrical understanding of processes **Outcome #4:** Develop strategies for warp mitigation to hold appropriate tolerance in parts printed with metal additive manufacturing equipment. ● Metal pool for metal AM ● Thermal dynamics applied to Metal ● Heat sink and raft quality and use ● Geometry and tolerance as it relates to accuracy ● Warp mitigation strategies ● Exposure modification for print quality and tolerance ● Hardware options for heat warp **Outcome #5:** Develop strategies and procedures for part removal and for reconditioning of build plate for re-use. ● Raft programming ● Part removal in relation to first layers ● EDM build plate part removal ● Friction process build plate removal ● EDM build plate resurfacing

	• Mill build plate resurfacing • Part geometry in regards to part removal from plate **Outcome #6:** Create basic costing analysis processes for printing of parts. • Powder usage and recovery rates • Gas consumption rates • Build length • Filter consumption rate • Recoater consumption rate • Cost prediction prior to printing • Cost calculation post printing • Data tracking for total print costing • Comparison of costing to traditional manufacturing techniques
Suggested Texts & Materials (specify if any texts or materials are required)	Use of listed Texts/Materials is not required unless so noted. • EOS Ignite Design for Additive Manufacturing • EOS Ignite Data Preparation • EOS Additive Academy Safety • Materials Properties for 3d Printing • Blender 3d Modeling Manual • 3d Part Generation Principles • Additive Manufacturing of Metal Parts • Additive Manufacturing Fundamentals • Stratasys E-Book on AM • https://www.ntop.com/resources/blog/what-is-design-for-additive-manufacturing/
Department Notes (optional)	Safety glasses are required at all times in the manufacturing lab, and are provided for students. Students may also purchase their own safety glasses from a local supplier. Long pants and closed toed shoes are required in the manufacturing labs at all times. Appropriate clothing must be worn to work in the lab (no synthetic materials, ect.). Safety requirements are covered prior to work in the lab.

SECTION #2 FUNCTION OF COURSE WITHIN EXISTING AND/OR NEW PROGRAM(S)		
New CTE courses must be attached to a degree and/or certificate. They cannot be offered until the degree or certificate is approved. Please answer below, as appropriate.		
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Name of certificate(s):		# credit:
Name of degree(s):		# credit:
Will this new course be part of a new, proposed CGCC certificate or degree?		☒ Yes ☐ No
Name of new certificate(s):	Additive Manufacturing Processes	# credit: 36
Name of new degree(s):	CNC and Additive Manufacturing Fabrication and Additive Manufacturing	# credit: 92, 96

Briefly explain how this course fits into the new or existing degrees /certificates noted above (i.e. requirement or elective):	requirement
Is this course used to supply related instruction for a certificate?	☐ Yes ☒ No
If **yes,** the related instruction form, available on the curriculum office website, must be completed and submitted together with this form.	

SECTION #3 ADDITIONAL INFORMATION FOR NEW CTE COURSES	
Transferability: Will this course transfer to another academic institution? Identify and describe the nature of the transfer.	no
IMPACT ON OTHER PROGRAMS AND DEPARTMENTS	
Are there degrees and/or certificates that are affected by the instruction of this course? If so, provide details.	no
Are there similar courses existing in other programs or disciplines at CGCC? If yes, provide details and/or describe the nature of acknowledgments and/or agreements that have been reached.	no
Is there any potential impact on another department? Identify and consult with Department chairs whose courses may be impacted by this course, such as: content overlap, course duplication, prerequisite need, enrollment increase or decrease, etc.	☐ Yes ☒ No
Explain and/or describe the nature of acknowledgments and/or agreements that have been reached.	n/a
Has the Library director been notified regarding the addition of this course and the need for any potential resources?	☒ Yes – date: 10.27.25 ☐ No
Implementation term:	☒ Start of next academic year (summer term) ☐ Specific term (if BEFORE next academic year):
Course approval is dependent on approval of the related certificate/degree submission which documents the placement of the new course. Degree/certificate status will impact the speed of the process. The Curriculum Office will notify the submitter, department chair, and department director when the course has completed the approval process and is available to be scheduled. Curriculum changes generally go into effect at the beginning of the next academic year (summer term). Mid-year revisions/additions are discouraged but accommodated when possible if there is a specific, identifiable need.	

SECTION #4 DEPARTMENT REVIEW		
"I vouch that this submission has been reviewed by the affiliated department chair and department dean/director and that they have given initial authorization for this submission. I am requesting that it be placed on the next Curriculum Committee agenda with available time slots. I understand that I am required to complete and submit, prior to the day my submission is reviewed by the Curriculum Committee, a Course Signature Form signed by the department chair and dean/director."		
Submitter	Email	Date
Robert Wells-Clark	rclark@cgcc.edu	10.28.25
Department Chair (enter name of department chair): Jim Pytel		
Department Dean/Director (enter name of department dean/director): Jarett Gilbert		

NEXT STEPS:

1. Save this document as the course prefix and number (e.g. MTH 65 or HST 104). Send completed form electronically to curriculum@cgcc.edu or slewis@cgcc.edu.
2. Refer to the curriculum office website for the Curriculum Committee meeting schedule and submission deadlines. You are encouraged to send submissions prior to the deadline so that the curriculum office may review and provide feedback.
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CC date 11.5.25
CC decision _____
CC vote _____

Columbia Gorge Community College

New Course
Career Technical Education (CTE)

(Double click on check boxes to activate dialog box)

SECTION #1 GENERAL INFORMATION				
Department:	Tech & Trades: Manufacturing		Submitter name: Phone: Email:	Robert Wells-Clark 541-514-1589 rclark@cgcc.edu
Prefix and Course Number:	MFG 251		Credits:	3
Course Title: (75 characters max, including spaces)	Metal Additive Manufacturing 2			
May this course be repeated for credit?	☐ Yes ☒ No	For how many times?	Contact hours:	Lecture: 0 Lec/lab: 66 Lab: 0
Is this course equivalent to another? They must have the same description, outcomes and credit.			☐ Yes ☒ No	Prefix, number and title:
Reason for the new course.	Requirement for new Additive Manufacturing certificate and related degrees.			

GRADE OPTIONS: Check as many or as few options as you'd like. **Choose the default grade option**. The default grade refers to the option that is listed at the top of the dropdown menu for the CRN. Students who do not make a choice or do not make a change in the dropdown menu will automatically be assigned to the default grade option.

	Check all that apply	Default (Choose one)
A-F (letter grade)	☒	☒
Pass/No pass	☒	☐
Audit in consultation with faculty	☒	☐

REQUISITES: Identify prerequisite, corequisite and concurrent course(s)

☐ placement into:	☐ placement into:		
course prefix & number: MFG 250	☒ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co

COURSE DESCRIPTION: To be used in the catalog and schedule of classes. Begin each sentence of the course description with an active verb. Avoid using the phrases: "This course will …" and/or "Students will ..." Include course requisites in the description. Guidelines for writing concise descriptions can be found at Writing Course Descriptions.

Builds upon metal additive techniques learned in MFG 250, addressing parts with more challenging geometry and learning to generate model preparations as applicable to part geometry. Introduces the printing of multiple parts at once during a build, with focus placed on key changes required when larger thermal mass is present. Practices printing parts with more challenging materials, moving from aluminum to magnesium and titanium, which require changes to powder handling tactics. Explores commonly available post-processing methods to improve the surface finish on printed parts, including tumbling and sandblasting. Prerequisite: MFG 250. Audit available.

LEARNING OUTCOMES: Describe what the student will be able to do "out there" (in their life roles as worker, family member, community citizen, global citizen or lifelong learners). Outcomes must be measurable through the application of direct and/or indirect assessment strategies. Three to six outcomes are recommended. Start each outcome with an active verb, completing the sentence starter provided. (See Writing Learning Outcomes on the curriculum website.)

Outcomes: (Use observable and measurable verbs)	Upon successful completion of this course, students will be able to: 1. Apply safe material handling and operating practices for metal additive manufacturing equipment relating to reactive powders. 2. Maintain metal additive manufacturing equipment and repair common failures. 3. Program metal additive manufacturing equipment for reactive powder. 4. Create support and heat-sink strategies to ensure build success and accuracy for more complex geometry. 5. Apply appropriate post processing strategies for desired finish and fit of parts. 6. Use comparative analysis to determine the ROI and cost-effectiveness of additive manufacturing compared to other possible manufacturing strategies.
Outcomes assessment strategies:	Department recommended assessment strategies: • Lecture and in-lab coaching and direct instruction. • Full class demonstration of skills. • Written exams. • Student proficiency through demonstration of learned strategies and skills in industry standard environments. • Job readiness based on performance. • In class lab experiments and testing using the scientific process with written result reporting.

COURSE CONTENT, ACTIVITIES AND DESIGN

Activity & Design: The determination of teaching strategies used in the delivery of outcomes is generally left to the discretion of the instructor. On occasion, a department may decide that the inclusion of a particular strategy will be required (specify in "required activities" box below). For example, a department may determine that a course will be required to incorporate a service learning project into its curriculum delivery. However, for the most part, delivery mechanisms fall under academic freedom and so the individuality and creativity of each instructor.

Here are some strategies that you might consider when designing your course: lecture, small group/forum discussion, flipped classroom, dyads, oral presentation, role play, simulation scenarios, group projects, service learning projects, hands-on lab, peer review/workshops, cooperative learning (jigsaw, fishbowl), inquiry-based instruction, differentiated instruction (learning centers), graphic organizers, etc.

Department required course activities (optional)	Cooperative learning, lecture-lab based experiential learning, guided learning pathways, peer review, hands-on lab, simulation, simulation scenarios, oral presentations.
Course Content – organized by outcomes (list each outcome followed by an outline of the related content)	**Outcome #1:** Apply safe material handling and operating practices for metal additive manufacturing equipment relating to reactive powders. • Reactive metal powder explosiveness • Reactive powder health concerns • Reactive metal powder contamination

- Reactive metal powder MSDS and KST values analysis
- Reactive metal powder PPE and when to use what PPE
- Reactive metal powder handling equipment
- Reactive metal powder processing equipment
- Safe operation of reactive powder processing equipment

Outcome #2: Maintain metal additive manufacturing equipment and repair common failures.

- Follow wiring diagrams
- Troubleshoot PLC systems
- Follow pneumatic diagrams
- Replace filters
- Replace gas cylinders
- Replace recoater systems
- Remove and replace build plates
- Troubleshoot using flow chart
- Check and/or replace fuses
- Use digital multi-meter to check electrical connections, amp draws

Outcome #3: Program Metal Additive Manufacturing Equipment for reactive powder.

- Program metal AM equipment using g-code
- Write successful metal AM programs
- Develop print parameters
- Calibrate different metal powders
- Check dimensional accuracy against calibrations
- Maximize powder recovery
- Safe powder recovery strategies, compare to non-reactive powders

Outcome #4: Create support and heat-sink strategies to ensure build success and accuracy for more complex geometry

- Create heat sinks
- Place melt pools
- Modify supports to suit geometry
- Modify geometry to suit metal AM
- Program complex parts
- Check success of prints
- Minimize post processing with successful programming strategy
- Generate successful programs for complex geometry using a variety of metal support parameters

	Outcome #5: Apply appropriate post processing strategies for desired finish and fit of parts • Post process using sandblasting • Post process using friction methods • Post process using appropriate tumbling media • Reduce post processing with programming • Post processing for soft materials • Post processing for hard materials • Strategize post processing for required part parameters • Verify success of post processing techniques with equipment **Outcome #6:** Use comparative analysis to determine the ROI and cost-effectiveness of additive manufacturing compared to other possible manufacturing strategies • Compare costs using developed data points and expected powder recovery rate and compare to reductive or casting strategies where appropriate • Understand the differentiation in total climate carbon offset between additive strategies and other methods of part creation • Develop a return on investment cost estimation for the serial creation of parts using an additive strategy as a direct comparison to another chose strategy
Suggested Texts & Materials (specify if any texts or materials are required)	Use of listed Texts/Materials is not required unless so noted. • EOS Ignite Design for Additive Manufacturing • EOS Ignite Data Preparation • EOS Additive Academy Safety • Materials Properties for 3d Printing • Blender 3d Modeling Manual • 3d Part Generation Principles • Additive Manufacturing of Metal Parts • Additive Manufacturing Fundamentals • Stratasys E-Book on AM • https://www.ntop.com/resources/blog/what-is-design-for-additive-manufacturing/
Department Notes (optional)	Safety glasses are required at all times in the manufacturing lab, and are provided for students. Students may also purchase their own safety glasses from a local supplier. Long pants and closed toed shoes are required in the manufacturing labs at all times. Appropriate clothing must be worn to work in the lab (no synthetic materials, ect.). Safety requirements are covered prior to work in the lab.

SECTION #2 FUNCTION OF COURSE WITHIN EXISTING AND/OR NEW PROGRAM(S)		
New CTE courses must be attached to a degree and/or certificate. They cannot be offered until the degree or certificate is approved. Please answer below, as appropriate.		
Will this new course be part of existing, currently approved CGCC certificate(s) and/or degree(s)?		☒ Yes ☐ No
Name of certificate(s):		# credit:
Name of degree(s):		# credit:

Will this new course be part of a new, proposed CGCC certificate or degree?		☒ Yes ☐ No
Name of new certificate(s):	Additive Manufacturing Processes	# credit: 36
Name of new degree(s):	CNC and Additive Manufacturing Fabrication and Additive Manufacturing	# credit: 92, 96
Briefly explain how this course fits into the new or existing degrees /certificates noted above (i.e. requirement or elective):	requirement	
Is this course used to supply related instruction for a certificate?		☐ Yes ☒ No
If **yes,** the related instruction form, available on the curriculum office website, must be completed and submitted together with this form.		

SECTION #3 ADDITIONAL INFORMATION FOR NEW CTE COURSES	
Transferability: Will this course transfer to another academic institution? Identify and describe the nature of the transfer.	no
IMPACT ON OTHER PROGRAMS AND DEPARTMENTS	
Are there degrees and/or certificates that are affected by the instruction of this course? If so, provide details.	no
Are there similar courses existing in other programs or disciplines at CGCC? If yes, provide details and/or describe the nature of acknowledgments and/or agreements that have been reached.	no
Is there any potential impact on another department? Identify and consult with Department chairs whose courses may be impacted by this course, such as: content overlap, course duplication, prerequisite need, enrollment increase or decrease, etc.	☐ Yes ☒ No
Explain and/or describe the nature of acknowledgments and/or agreements that have been reached.	n/a
Has the Library director been notified regarding the addition of this course and the need for any potential resources?	☒ Yes – date: 10.27.25 ☐ No
Implementation term:	☒ Start of next academic year (summer term) ☐ Specific term (if BEFORE next academic year):

Course approval is dependent on approval of the related certificate/degree submission which documents the placement of the new course. Degree/certificate status will impact the speed of the process. The Curriculum Office will notify the submitter, department chair, and department director when the course has completed the approval process and is available to be scheduled. Curriculum changes generally go into effect at the beginning of the next academic year (summer term). Mid-year revisions/additions are discouraged but accommodated when possible if there is a specific, identifiable need.

SECTION #4 DEPARTMENT REVIEW

"I vouch that this submission has been reviewed by the affiliated department chair and department dean/director and that they have given initial authorization for this submission. I am requesting that it be placed on the next Curriculum Committee agenda with available time slots. I understand that I am required to complete and submit, prior to the day my submission is reviewed by the Curriculum Committee, a Course Signature Form signed by the department chair and dean/director."

Submitter	Email	Date
Robert Wells-Clark	rclark@cgcc.edu	10.28.25
Department Chair (enter name of department chair): Jim Pytel		
Department Dean/Director (enter name of department dean/director): Jarett Gilbert		

NEXT STEPS:

1. Save this document as the course prefix and number (e.g. MTH 65 or HST 104). Send completed form electronically to curriculum@cgcc.edu or slewis@cgcc.edu.
2. Refer to the curriculum office website for the Curriculum Committee meeting schedule and submission deadlines. You are encouraged to send submissions prior to the deadline so that the curriculum office may review and provide feedback.
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CC date 11.5.25
CC decision _____
CC vote _____

Columbia Gorge Community College

New Course
Career Technical Education (CTE)

(Double click on check boxes to activate dialog box)

SECTION #1 GENERAL INFORMATION				
Department:	Tech & Trades: Manufacturing		Submitter name: Phone: Email:	Robert Wells-Clark 541-514-1589 rclark@cgcc.edu
Prefix and Course Number:	MFG 252		Credits:	3
Course Title: (75 characters max, including spaces)	Metal Additive Manufacturing 3			
May this course be repeated for credit?	☐ Yes ☒ No	For how many times?	Contact hours:	Lecture: 0 Lec/lab: 66 Lab: 0
Is this course equivalent to another? They must have the same description, outcomes and credit.			☐ Yes ☒ No	Prefix, number and title:
Reason for the new course.	Requirement for new Additive Manufacturing certificate and related degrees.			

GRADE OPTIONS: Check as many or as few options as you'd like. **Choose the default grade option**. The default grade refers to the option that is listed at the top of the dropdown menu for the CRN. Students who do not make a choice or do not make a change in the dropdown menu will automatically be assigned to the default grade option.

	Check all that apply	Default (Choose one)
A-F (letter grade)	☒	☒
Pass/No pass	☒	☐
Audit in consultation with faculty	☒	☐

REQUISITES: Identify prerequisite, corequisite and concurrent course(s)

☐ placement into:	☐ placement into:		
course prefix & number: MFG 251	☒ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co

COURSE DESCRIPTION: To be used in the catalog and schedule of classes. Begin each sentence of the course description with an active verb. Avoid using the phrases: "This course will …" and/or "Students will ..." Include course requisites in the description. Guidelines for writing concise descriptions can be found at Writing Course Descriptions.

Builds upon metal additive techniques learned in MFG 251. Involves printing parts requiring more specific final dimensions, engaging in more rigorous model preparations required to mitigate problems associated with close tolerance geometry. Explores production strategies to achieve tightly toleranced part dimensions, starting with additive techniques and moving on to reductive finishing methods. Introduces strategies to print at near net shape, with excess material on critical surfaces to be cut with precision reductive CNC machines. Includes printing in highly challenging materials, such as titanium, which require specific powder handling techniques and model preparations due to metallurgical properties such as thermal expansion/contraction, conductivity/dissipation. Prerequisite: MFG 251. Audit available.

LEARNING OUTCOMES: Describe what the student will be able to do "out there" (in their life roles as worker, family member, community citizen, global citizen or lifelong learners). Outcomes must be measurable through the application of direct and/or indirect assessment strategies. Three to six outcomes are recommended. Start each outcome with an active verb, completing the sentence starter provided. (See Writing Learning Outcomes on the curriculum website.)

Outcomes: (Use observable and measurable verbs)	Upon successful completion of this course, students will be able to: 1. Perform calibration procedures necessary for optimization of accuracy in metal additive manufacturing equipment. 2. Develop production orientated strategies for large scale longer duration builds. 3. Use geometry offset planning and requisite math for near-net shape manufacturing of technical parts. 4. Optimize print efficiency and orientation strategies for complex parts. 5. Perform root cause analysis of failed or out of tolerance builds, and plan program changes to address them. 6. Utilize mixed process strategies to produce to tolerance parts, including using reductive post processing programming.
Outcomes assessment strategies:	Department recommended assessment strategies: • Lecture and in-lab coaching and direct instruction. • Full class demonstration of skills. • Written exams. • Student proficiency through demonstration of learned strategies and skills in industry standard environments. • Job readiness based on performance. • In class lab experiments and testing using the scientific process with written result reporting.

COURSE CONTENT, ACTIVITIES AND DESIGN

Activity & Design: The determination of teaching strategies used in the delivery of outcomes is generally left to the discretion of the instructor. On occasion, a department may decide that the inclusion of a particular strategy will be required (specify in "required activities" box below). For example, a department may determine that a course will be required to incorporate a service learning project into its curriculum delivery. However, for the most part, delivery mechanisms fall under academic freedom and so the individuality and creativity of each instructor.

Here are some strategies that you might consider when designing your course: lecture, small group/forum discussion, flipped classroom, dyads, oral presentation, role play, simulation scenarios, group projects, service learning projects, hands-on lab, peer review/workshops, cooperative learning (jigsaw, fishbowl), inquiry-based instruction, differentiated instruction (learning centers), graphic organizers, etc.

Department required course activities (optional)	Cooperative learning, lecture-lab based experiential learning, guided learning pathways, peer review, hands-on lab, simulation, simulation scenarios, oral presentations.
Course Content – organized by outcomes (list each outcome followed by an outline of the related content)	**Outcome #1:** Perform calibration procedures necessary for optimization of accuracy in metal additive manufacturing equipment. • Run calibration protocols and programs • Check calibration results • Based on calibrations, make adjustments

	● Verify results of calibrations via testing ● Measure calibrations ● Use software compensation for calibration ● Use hardware adjustments to calibrate equipment ● Calibrate laser apertures **Outcome #2:** Develop production orientated strategies for large scale longer duration builds ● Orientate multiple parts on plate ● Use recoater strategy for success ● Software for risk mitigation and assessment ● Maximize volume of build per millimeter height ● Geometrically align parts for higher success ● Use soft and hard recoater strategies **Outcome #3:** Use geometry offset planning and requisite math for near-net shape manufacturing of technical parts ● Modify geometry for success ● Identify difficult geometry and reorientate to minimize failure ● Create modelling offsets for metal printing ● Create programming offsets for metal printing ● Use algebra to calculate offsets ● Use trigonometry to calculate offsets ● Compensate for downskin ● Support downskin with different strategies **Outcome #4:** Optimize print efficiency and orientation strategies for complex parts ● Use software to orientate more quickly ● Optimize prints for consumable efficiency ● Track print efficiency ● Record data pertaining to print efficiency ● Support optimization for build plate removal ● Support optimization for exterior removal from parts ● Support optimization for interior removal from parts ● Geometrical changes for print optimization ● Geometrical changes for post processing optimization **Outcome #5:** Perform root cause analysis of failed or out of tolerance builds, and plan program changes to address them. ● Inspect a variety of build failures ● Make corrective actions ● Analyze changes to print profiles that have failed

	• Consider software reasons for failure • Consider hardware reasons for failure • Consider consumable, such as powder, reasons for failure • Correct build failures by determining reasons for failure • Use data from build failures to create a successful and repeatable build program **Outcome #6:** Utilized mixed process strategies to produce to tolerance parts, including using reductive post processing programming • Create sacrificial geometry • Cut to tolerance with reductive process • Cut to tolerance with post processing procedures • Post process to save cost when considered with other factors • Cut total cost with mixed strategies • Program CNC equipment outside of 3d printers to process 3d prints
Suggested Texts & Materials (specify if any texts or materials are required)	Use of listed Texts/Materials is not required unless so noted. • EOS Ignite Design for Additive Manufacturing • EOS Ignite Data Preparation • EOS Additive Academy Safety • Materials Properties for 3d Printing • Blender 3d Modeling Manual • 3d Part Generation Principles • Additive Manufacturing of Metal Parts • Additive Manufacturing Fundamentals • Stratasys E-Book on AM • https://www.ntop.com/resources/blog/what-is-design-for-additive-manufacturing/
Department Notes (optional)	Safety glasses are required at all times in the manufacturing lab, and are provided for students. Students may also purchase their own safety glasses from a local supplier. Long pants and closed toed shoes are required in the manufacturing labs at all times. Appropriate clothing must be worn to work in the lab (no synthetic materials, ect.). Safety requirements are covered prior to work in the lab.

SECTION #2 FUNCTION OF COURSE WITHIN EXISTING AND/OR NEW PROGRAM(S)		
New CTE courses must be attached to a degree and/or certificate. They cannot be offered until the degree or certificate is approved. Please answer below, as appropriate.		
Will this new course be part of existing, currently approved CGCC certificate(s) and/or degree(s)?		☒ Yes ☐ No
Name of certificate(s):		# credit:
Name of degree(s):		# credit:
Will this new course be part of a new, proposed CGCC certificate or degree?		☒ Yes ☐ No
Name of new certificate(s):	Additive Manufacturing Processes	# credit: 36
Name of new degree(s):	CNC and Additive Manufacturing Fabrication and Additive Manufacturing	# credit: 92, 96

Briefly explain how this course fits into the new or existing degrees /certificates noted above (i.e. requirement or elective):	requirement
Is this course used to supply related instruction for a certificate?	☐ Yes ☒ No
If **yes,** the related instruction form, available on the curriculum office website, must be completed and submitted together with this form.	

SECTION #3 ADDITIONAL INFORMATION FOR NEW CTE COURSES	
Transferability: Will this course transfer to another academic institution? Identify and describe the nature of the transfer.	no
IMPACT ON OTHER PROGRAMS AND DEPARTMENTS	
Are there degrees and/or certificates that are affected by the instruction of this course? If so, provide details.	no
Are there similar courses existing in other programs or disciplines at CGCC? If yes, provide details and/or describe the nature of acknowledgments and/or agreements that have been reached.	no
Is there any potential impact on another department? Identify and consult with Department chairs whose courses may be impacted by this course, such as: content overlap, course duplication, prerequisite need, enrollment increase or decrease, etc.	☐ Yes ☒ No
Explain and/or describe the nature of acknowledgments and/or agreements that have been reached.	n/a
Has the Library director been notified regarding the addition of this course and the need for any potential resources?	☒ Yes – date: 10.27.25 ☐ No
Implementation term:	☒ Start of next academic year (summer term) ☐ Specific term (if BEFORE next academic year):
Course approval is dependent on approval of the related certificate/degree submission which documents the placement of the new course. Degree/certificate status will impact the speed of the process. The Curriculum Office will notify the submitter, department chair, and department director when the course has completed the approval process and is available to be scheduled. Curriculum changes generally go into effect at the beginning of the next academic year (summer term). Mid-year revisions/additions are discouraged but accommodated when possible if there is a specific, identifiable need.	

SECTION #4 DEPARTMENT REVIEW		
"I vouch that this submission has been reviewed by the affiliated department chair and department dean/director and that they have given initial authorization for this submission. I am requesting that it be placed on the next Curriculum Committee agenda with available time slots. I understand that I am required to complete and submit, prior to the day my submission is reviewed by the Curriculum Committee, a Course Signature Form signed by the department chair and dean/director."		
Submitter	Email	Date
Robert Wells-Clark	rclark@cgcc.edu	10.28.25
Department Chair (enter name of department chair): Jim Pytel		
Department Dean/Director (enter name of department dean/director): Jarett Gilbert		

NEXT STEPS:

1. Save this document as the course prefix and number (e.g. MTH 65 or HST 104). Send completed form electronically to curriculum@cgcc.edu or slewis@cgcc.edu.
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CC date 11.5.25
CC decision _____
CC vote _____

Columbia Gorge Community College

New Course
Career Technical Education (CTE)

(Double click on check boxes to activate dialog box)

SECTION #1 GENERAL INFORMATION				
Department:	Tech & Trades: Manufacturing		Submitter name: Phone: Email:	Robert Wells-Clark 541-514-1589 rclark@cgcc.edu
Prefix and Course Number:	MFG 260		Credits:	3
Course Title: (75 characters max, including spaces)	Metrology for Additive Manufacturing			
May this course be repeated for credit?	☐ Yes ☒ No	For how many times?	Contact hours:	Lecture: 0 Lec/lab: 66 Lab: 0
Is this course equivalent to another? They must have the same description, outcomes and credit.			☐ Yes ☒ No	Prefix, number and title:
Reason for the new course.	Requirement for new Additive Manufacturing certificate and related degrees.			

GRADE OPTIONS: Check as many or as few options as you'd like. **Choose the default grade option**. The default grade refers to the option that is listed at the top of the dropdown menu for the CRN. Students who do not make a choice or do not make a change in the dropdown menu will automatically be assigned to the default grade option.

	Check all that apply	Default (Choose one)
A-F (letter grade)	☒	☒
Pass/No pass	☒	☐
Audit in consultation with faculty	☒	☐

REQUISITES: Identify prerequisite, corequisite and concurrent course(s)

☐ placement into:	☐ placement into:		
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co

COURSE DESCRIPTION: To be used in the catalog and schedule of classes. Begin each sentence of the course description with an active verb. Avoid using the phrases: "This course will …" and/or "Students will ..." Include course requisites in the description. Guidelines for writing concise descriptions can be found at Writing Course Descriptions.

Covers the use of additive technology and material calibration skills to produce, on a consistent basis, a variety of parts accurate to specified measurements and tolerances provided on blueprints. Explores the nuances of additive design principles and how they apply to the measurement of parts made using AM processes. Utilizes procedures and measuring tools specific to additive manufacturing. Audit available.

LEARNING OUTCOMES: Describe what the student will be able to do "out there" (in their life roles as worker, family member, community citizen, global citizen or lifelong learners). Outcomes must be measurable

<table>
<tr><td colspan="2">through the application of direct and/or indirect assessment strategies. Three to six outcomes are recommended. Start each outcome with an active verb, completing the sentence starter provided. (See Writing Learning Outcomes on the curriculum website.)</td></tr>
<tr><td rowspan="2">Outcomes: (Use observable and measurable verbs)</td><td>Upon successful completion of this course, students will be able to:</td></tr>
<tr><td>1. Calibrate 3D printer settings establishing model tolerances for AM specific process control.
2. Use scientific methods to determine when 3D printing materials are in poor condition and need reconditioning.
3. Read blueprints and interpret tolerances.
4. Use measuring equipment specific to additive manufacturing.
5. Use knowledge of material properties to streamline post processing and improve print quality.</td></tr>
<tr><td>Outcomes assessment strategies:</td><td>Department recommended assessment strategies:
Lecture and in-lab coaching and direct instruction.
Full class demonstration of skills.
Written exams.
Student proficiency through demonstration of learned strategies and skills in industry standard environments.
Job readiness based on performance.
In class lab experiments and testing using the scientific process with written result reporting.</td></tr>
<tr><td colspan="2">COURSE CONTENT, ACTIVITIES AND DESIGN</td></tr>
<tr><td colspan="2">Activity & Design: The determination of teaching strategies used in the delivery of outcomes is generally left to the discretion of the instructor. On occasion, a department may decide that the inclusion of a particular strategy will be required (specify in “required activities” box below). For example, a department may determine that a course will be required to incorporate a service learning project into its curriculum delivery. However, for the most part, delivery mechanisms fall under academic freedom and so the individuality and creativity of each instructor.
Here are some strategies that you might consider when designing your course: lecture, small group/forum discussion, flipped classroom, dyads, oral presentation, role play, simulation scenarios, group projects, service learning projects, hands-on lab, peer review/workshops, cooperative learning (jigsaw, fishbowl), inquiry-based instruction, differentiated instruction (learning centers), graphic organizers, etc.</td></tr>
<tr><td>Department required course activities (optional)</td><td>Cooperative learning, lecture-lab based experiential learning, guided learning pathways, peer review, hands-on lab, simulation, simulation scenarios, oral presentations.</td></tr>
<tr><td>Course Content – organized by outcomes (list each outcome followed by an outline of the related content)</td><td>Outcome #1: Calibrate 3D printer settings, establishing model tolerances for AM specific process control.
Calibrate for accuracy SLS, FDM and SLA printer hardware
Create calibration procedures for SLS, FDM and SLA printers
Troubleshoot consumable problems and solutions for SLS, FDM and SLA printers
Troubleshoot hardware problems in SLS, FDM and SLA printers
Troubleshoot software problems in SLS, FDM and SLA printers</td></tr>
</table>

	Outcome #2: Use scientific methods to determine when 3D printing materials are in poor condition and need reconditioning. ● Follow / create flowcharts for different printing materials ● Quality control filament, resin and polymer powder (3d printing materials) ● Repair 3d printing materials ● Track 3d printing materials inventory ● Use inventory to track 3d printing materials degradation **Outcome #3:** Read blueprints and interpret tolerances. ● Read GD&T In blueprints ● Print to tolerance ● Use geometry to ensure print accuracy ● Check print accuracy to tolerance ● Reduce tolerance stacking with geometry ● Reduce tolerance stacking with process selection ● Ensure tolerance with post processing considerations **Outcome #4:** Use measuring equipment specific to additive manufacturing ● Measure critical geometry ● Precision measuring tools for additive manufacturing ● Check density per print requirements ● Check density vs. expected density ● Surface finish testing ● Bending Modulus Testing ● Heat tolerance check ● Edit parameters (e.g. laser exposure, nozzle temperature, variable layer height) for localized geometry tolerance **Outcome #5:** Use knowledge of material properties to streamline post processing and improve print quality ● Post process with appropriate processes ● Post process to with correct materials and equipment for print call outs ● Edit parameters to ensure efficient post processing ● Design for manufacture with post processing procedures to print in mind ● Process for hardness ● Process for surface finish ● Process for bending modulus
Suggested Texts & Materials (specify if any texts or materials are required)	Use of listed Texts/Materials is not required unless so noted. • EOS Ignite Design for Additive Manufacturing • EOS Ignite Data Preparation • EOS Additive Academy Safety

	• Materials Properties for 3d Printing • Blender 3d Modeling Manual • 3d Part Generation Principles • Additive Manufacturing of Metal Parts • Additive Manufacturing Fundamentals • Stratasys E-Book on AM • https://www.ntop.com/resources/blog/what-is-design-for-additive-manufacturing/
Department Notes (optional)	Safety glasses are required at all times in the manufacturing lab, and are provided for students. Students may also purchase their own safety glasses from a local supplier. Long pants and closed toed shoes are required in the manufacturing labs at all times. Appropriate clothing must be worn to work in the lab (no synthetic materials, ect.). Safety requirements are covered prior to work in the lab.

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Will this new course be part of existing, currently approved CGCC certificate(s) and/or degree(s)?		☒ Yes ☐ No
Name of certificate(s):		# credit:
Name of degree(s):		# credit:
Will this new course be part of a new, proposed CGCC certificate or degree?		☒ Yes ☐ No
Name of new certificate(s):	Additive Manufacturing Processes	# credit: 36
Name of new degree(s):	CNC and Additive Manufacturing Fabrication and Additive Manufacturing	# credit: 92, 96
Briefly explain how this course fits into the new or existing degrees /certificates noted above (i.e. requirement or elective):	requirement	
Is this course used to supply related instruction for a certificate?		☐ Yes ☒ No
If **yes,** the related instruction form, available on the curriculum office website, must be completed and submitted together with this form.		

SECTION #3 ADDITIONAL INFORMATION FOR NEW CTE COURSES	
Transferability: Will this course transfer to another academic institution? Identify and describe the nature of the transfer.	no
IMPACT ON OTHER PROGRAMS AND DEPARTMENTS	
Are there degrees and/or certificates that are affected by the instruction of this course? If so, provide details.	no

Are there similar courses existing in other programs or disciplines at CGCC? If yes, provide details and/or describe the nature of acknowledgments and/or agreements that have been reached.	no
Is there any potential impact on another department? Identify and consult with Department chairs whose courses may be impacted by this course, such as: content overlap, course duplication, prerequisite need, enrollment increase or decrease, etc.	☐ Yes ☒ No
Explain and/or describe the nature of acknowledgments and/or agreements that have been reached.	n/a
Has the Library director been notified regarding the addition of this course and the need for any potential resources?	☒ Yes – date: 10.27.25 ☐ No
Implementation term:	☒ Start of next academic year (summer term) ☐ Specific term (if BEFORE next academic year):
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Submitter	Email	Date
Robert Wells-Clark	rclark@cgcc.edu	10.28.25
Department Chair (enter name of department chair): Jim Pytel		
Department Dean/Director (enter name of department dean/director): Jarett Gilbert		

NEXT STEPS:

1. Save this document as the course prefix and number (e.g. MTH 65 or HST 104). Send completed form electronically to curriculum@cgcc.edu or slewis@cgcc.edu.
2. Refer to the curriculum office website for the Curriculum Committee meeting schedule and submission deadlines. You are encouraged to send submissions prior to the deadline so that the curriculum office may review and provide feedback.
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CC date 11.5.25
CC decision _____
CC vote _____

Columbia Gorge Community College

New Course
Career Technical Education (CTE)

(Double click on check boxes to activate dialog box)

SECTION #1 GENERAL INFORMATION				
Department:	Tech & Trades: Manufacturing		Submitter name: Phone: Email:	Robert Wells-Clark 541-514-1589 rclark@cgcc.edu
Prefix and Course Number:	MFG 261		Credits:	3
Course Title: (75 characters max, including spaces)	Iterative Production Manufacturing for Additive Manufacturing			
May this course be repeated for credit?	☐ Yes ☒ No	For how many times?	Contact hours:	Lecture: 0 Lec/lab: 66 Lab: 0
Is this course equivalent to another? They must have the same description, outcomes and credit.			☐ Yes ☒ No	Prefix, number and title:
Reason for the new course.	Requirement for new Additive Manufacturing certificate and related degrees.			

GRADE OPTIONS: Check as many or as few options as you'd like. **Choose the default grade option**. The default grade refers to the option that is listed at the top of the dropdown menu for the CRN. Students who do not make a choice or do not make a change in the dropdown menu will automatically be assigned to the default grade option.

	Check all that apply	Default (Choose one)
A-F (letter grade)	☒	☒
Pass/No pass	☒	☐
Audit in consultation with faculty	☒	☐

REQUISITES: Identify prerequisite, corequisite and concurrent course(s)

☐ placement into:	☐ placement into:		
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co

COURSE DESCRIPTION: To be used in the catalog and schedule of classes. Begin each sentence of the course description with an active verb. Avoid using the phrases: "This course will …" and/or "Students will ..." Include course requisites in the description. Guidelines for writing concise descriptions can be found at Writing Course Descriptions.

Explores additive technology and develops prototyping techniques to design and efficiently produce parts that take advantage of the strengths of additive manufacturing technology. Compares designs across iterations, with changes intended to increase production efficiency. Analyzes production design and production methods. Analyzes each process and prepares students to perform associated changes at intervals to evaluate efficacy of methods used. Audit available.

LEARNING OUTCOMES: Describe what the student will be able to do "out there" (in their life roles as worker, family member, community citizen, global citizen or lifelong learners). Outcomes must be measurable through the application of direct and/or indirect assessment strategies. Three to six outcomes are recommended. Start each outcome with an active verb, completing the sentence starter provided. (See Writing Learning Outcomes on the curriculum website.)

Outcomes: (Use observable and measurable verbs)	Upon successful completion of this course, students will be able to: 1. Produce parts of a consistent quality using root cause analysis to develop repeatable programs. 2. Document production processes, printing time and material usage. 3. Reproduce parts made from a reductive or casting process to optimize strengths of additive technology. 4. Calculate strength changes using finite element analysis, and cost offsets impacted by successful additive manufacturing technology adoption. 5. Develop AM production process engineering iteration and data-chain workflow. 6. Directly compare different processes, materials and methods for production and determine best-fit workflow.
Outcomes assessment strategies:	Department recommended assessment strategies: • Lecture and in-lab coaching and direct instruction. • Full class demonstration of skills. • Written exams. • Student proficiency through demonstration of learned strategies and skills in industry standard environments. • Job readiness based on performance. • In class lab experiments and testing using the scientific process with written result reporting.

COURSE CONTENT, ACTIVITIES AND DESIGN

Activity & Design: The determination of teaching strategies used in the delivery of outcomes is generally left to the discretion of the instructor. On occasion, a department may decide that the inclusion of a particular strategy will be required (specify in "required activities" box below). For example, a department may determine that a course will be required to incorporate a service learning project into its curriculum delivery. However, for the most part, delivery mechanisms fall under academic freedom and so the individuality and creativity of each instructor.

Here are some strategies that you might consider when designing your course: lecture, small group/forum discussion, flipped classroom, dyads, oral presentation, role play, simulation scenarios, group projects, service learning projects, hands-on lab, peer review/workshops, cooperative learning (jigsaw, fishbowl), inquiry-based instruction, differentiated instruction (learning centers), graphic organizers, etc.

Department required course activities (optional)	Cooperative learning, lecture-lab based experiential learning, guided learning pathways, peer review, hands-on lab, simulation, simulation scenarios, oral presentations.
Course Content – organized by outcomes (list each outcome followed by an outline of the related content)	**Outcome #1:** Produce parts of a consistent quality using root cause analysis to develop repeatable programs • Print to tolerance • Use print failures to change print profiles • Repeatability of profiles • Optimize print profiles for cost

- Failure root cause analysis
- Corrective actions
- Print programs multiple times to ensure they are production ready

Outcome #2: Document production processes, printing time and material usage

- Data point tracking
- Time vs. Cost vs. Quantity for SLS, SLA and FDM prints
- Print time tracking
- Print volume tracking
- Optimization of print procedure
- Automation options for printing
- Material efficiency optimization for print end-use

Outcome #3: Reproduce parts made from a reductive or casting process to optimize strengths of additive technology

- Recreate parts
- Improve existing parts
- Reduce weight of existing designs
- Increase strength of existing designs
- Improve fit to end use using additive technology
- Check geometry for challenges in additive processes; such as printed threads.

Outcome #4: Calculate cost, strength and finite element analysis changes impacted by successful additive manufacturing technology adoption

- Compare additive manufacturing cost to other modalities of production
- Strength comparisons practical and in software
- Geometry changes possible in additive and their benefits and challenges
- Functional testing of printed parts
- Comparative testing of printed parts, and parts from other modalities\
- Environmental cost offset calculator for different modalities
- Additive manufacturing trade-offs

Outcome #5: Develop additive manufacturing production process engineering iteration and data-chain workflow

- Equipment use and type guidance for manufacturing
- Design to equipment on hand
- Make changes in workflow to check results
- Track results on print process based on changes
- Downstream data flow to create parts that fit parameters necessary for real-world use

	Outcome #6: Directly compare different processes, materials and methods for production and determine best-fit workflow • End-use parameters and engineering • Material best fit • Test in different materials for end-use • Real world testing comparisons • Production considerations of different materials and cost-benefit analysis • Test competing processes for real world comparison prior to production.
Suggested Texts & Materials (specify if any texts or materials are required)	Use of listed Texts/Materials is not required unless so noted. • EOS Ignite Design for Additive Manufacturing • EOS Ignite Data Preparation • EOS Additive Academy Safety • Materials Properties for 3d Printing • Blender 3d Modeling Manual • 3d Part Generation Principles • Additive Manufacturing of Metal Parts • Additive Manufacturing Fundamentals • Stratasys E-Book on AM • https://www.ntop.com/resources/blog/what-is-design-for-additive-manufacturing/
Department Notes (optional)	Safety glasses are required at all times in the manufacturing lab, and are provided for students. Students may also purchase their own safety glasses from a local supplier. Long pants and closed toed shoes are required in the manufacturing labs at all times. Appropriate clothing must be worn to work in the lab (no synthetic materials, ect.). Safety requirements are covered prior to work in the lab.

SECTION #2 FUNCTION OF COURSE WITHIN EXISTING AND/OR NEW PROGRAM(S)		
New CTE courses must be attached to a degree and/or certificate. They cannot be offered until the degree or certificate is approved. Please answer below, as appropriate.		
Will this new course be part of existing, currently approved CGCC certificate(s) and/or degree(s)?		☒ Yes ☐ No
Name of certificate(s):		# credit:
Name of degree(s):		# credit:
Will this new course be part of a new, proposed CGCC certificate or degree?		☒ Yes ☐ No
Name of new certificate(s):	Additive Manufacturing Processes	# credit: 36
Name of new degree(s):	CNC and Additive Manufacturing Fabrication and Additive Manufacturing	# credit: 92, 96
Briefly explain how this course fits into the new or existing degrees /certificates noted above (i.e. requirement or elective):	requirement	

Is this course used to supply related instruction for a certificate?	☐ Yes ☒ No
If **yes,** the related instruction form, available on the curriculum office website, must be completed and submitted together with this form.	
SECTION #3 ADDITIONAL INFORMATION FOR NEW CTE COURSES	
Transferability: Will this course transfer to another academic institution? Identify and describe the nature of the transfer.	no
IMPACT ON OTHER PROGRAMS AND DEPARTMENTS	
Are there degrees and/or certificates that are affected by the instruction of this course? If so, provide details.	no
Are there similar courses existing in other programs or disciplines at CGCC? If yes, provide details and/or describe the nature of acknowledgments and/or agreements that have been reached.	no
Is there any potential impact on another department? Identify and consult with Department chairs whose courses may be impacted by this course, such as: content overlap, course duplication, prerequisite need, enrollment increase or decrease, etc.	☐ Yes ☒ No
Explain and/or describe the nature of acknowledgments and/or agreements that have been reached.	n/a
Has the Library director been notified regarding the addition of this course and the need for any potential resources?	☒ Yes – date: 10.27.25 ☐ No
Implementation term:	☒ Start of next academic year (summer term) ☐ Specific term (if BEFORE next academic year):
Course approval is dependent on approval of the related certificate/degree submission which documents the placement of the new course. Degree/certificate status will impact the speed of the process. The Curriculum Office will notify the submitter, department chair, and department director when the course has completed the approval process and is available to be scheduled. Curriculum changes generally go into effect at the beginning of the next academic year (summer term). Mid-year revisions/additions are discouraged but accommodated when possible if there is a specific, identifiable need.	

SECTION #4 DEPARTMENT REVIEW		
"I vouch that this submission has been reviewed by the affiliated department chair and department dean/director and that they have given initial authorization for this submission. I am requesting that it be placed on the next Curriculum Committee agenda with available time slots. I understand that I am required to complete and submit, prior to the day my submission is reviewed by the Curriculum Committee, a Course Signature Form signed by the department chair and dean/director."		
Submitter	Email	Date
Robert Wells-Clark	rclark@cgcc.edu	10.28.25
Department Chair (enter name of department chair): Jim Pytel		
Department Dean/Director (enter name of department dean/director): Jarett Gilbert		

CC date 11.5.25
CC decision _____
CC vote _____

Columbia Gorge Community College

New Course
Career Technical Education (CTE)

(Double click on check boxes to activate dialog box)

SECTION #1 GENERAL INFORMATION				
Department:	Tech & Trades: Manufacturing		Submitter name: Phone: Email:	Robert Wells-Clark 541-514-1589 rclark@cgcc.edu
Prefix and Course Number:	MFG 262		Credits:	3
Course Title: (75 characters max, including spaces)	Multi-Process and Production Additive Manufacturing			
May this course be repeated for credit?	☐ Yes ☒ No	For how many times?	Contact hours:	Lecture: 0 Lec/lab: 66 Lab: 0
Is this course equivalent to another? They must have the same description, outcomes and credit.			☐ Yes ☒ No	Prefix, number and title:
Reason for the new course.	Requirement for new Additive Manufacturing certificate and related degrees.			

GRADE OPTIONS: Check as many or as few options as you'd like. **Choose the default grade option**. The default grade refers to the option that is listed at the top of the dropdown menu for the CRN. Students who do not make a choice or do not make a change in the dropdown menu will automatically be assigned to the default grade option.

	Check all that apply	Default (Choose one)
A-F (letter grade)	☒	☒
Pass/No pass	☒	☐
Audit in consultation with faculty	☒	☐

REQUISITES: Identify prerequisite, corequisite and concurrent course(s)

☐ placement into:	☐ placement into:		
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co
course prefix & number:	☐ prerequisite	☐ corequisite	☐ pre/co

COURSE DESCRIPTION: To be used in the catalog and schedule of classes. Begin each sentence of the course description with an active verb. Avoid using the phrases: "This course will …" and/or "Students will ..." Include course requisites in the description. Guidelines for writing concise descriptions can be found at Writing Course Descriptions.

Explores the creation of high-volume production strategies for a variety of parts and geometries. Demonstrates efficient production strategies, utilizing time and cost saving measures. Trains in the tracking of data as parts are produced, using additive technology to start and reductive technology to finish surfaces and meet tight tolerances. Compares, analyzes and uses different manufacturing strategies, based on the product produced, to determine advantages and disadvantages of each, as well as the potential return on investment. Audit available.

LEARNING OUTCOMES: Describe what the student will be able to do "out there" (in their life roles as worker, family member, community citizen, global citizen or lifelong learners). Outcomes must be measurable through the application of direct and/or indirect assessment strategies. Three to six outcomes are recommended. Start each outcome with an active verb, completing the sentence starter provided. (See Writing Learning Outcomes on the curriculum website.)

Outcomes: (Use observable and measurable verbs)	Upon successful completion of this course, students will be able to: 1. Prepare printing programs designed for high volume production and efficient use of time. 2. Produce finished parts of consistent quality. 3. Design parts with excess stock on critical surfaces with the intention of reductive finishing to tolerance. 4. Meet tight tolerances by finishing AM parts with precision reductive machining methods. 5. Document production methods, printing times, and material usage to include in return-on-investment calculations.
Outcomes assessment strategies:	Department recommended assessment strategies: • Lecture and in-lab coaching and direct instruction. • Full class demonstration of skills. • Written exams. • Student proficiency through demonstration of learned strategies and skills in industry standard environments. • Job readiness based on performance. • In class lab experiments and testing using the scientific process with written result reporting.

COURSE CONTENT, ACTIVITIES AND DESIGN

Activity & Design: The determination of teaching strategies used in the delivery of outcomes is generally left to the discretion of the instructor. On occasion, a department may decide that the inclusion of a particular strategy will be required (specify in "required activities" box below). For example, a department may determine that a course will be required to incorporate a service learning project into its curriculum delivery. However, for the most part, delivery mechanisms fall under academic freedom and so the individuality and creativity of each instructor.

Here are some strategies that you might consider when designing your course: lecture, small group/forum discussion, flipped classroom, dyads, oral presentation, role play, simulation scenarios, group projects, service learning projects, hands-on lab, peer review/workshops, cooperative learning (jigsaw, fishbowl), inquiry-based instruction, differentiated instruction (learning centers), graphic organizers, etc.

Department required course activities (optional)	Cooperative learning, lecture-lab based experiential learning, guided learning pathways, peer review, hands-on lab, simulation, simulation scenarios, oral presentations.
Course Content – organized by outcomes (list each outcome followed by an outline of the related content)	**Outcome #1:** Prepare printing programs designed for high volume production and efficient use of time • Optimize build volume in SLS, SLA and FDM printing • Program efficiency • Compare programming options

- Production volume fitting for print type
- Cost analysis and break-even points

Outcome #2: Produce finished parts of consistent quality

- Parameters for production needs
- Parameters for build volume density
- Print modality comparisons
- Print modality for production comparisons
- Process efficiency curves
- Change procedures and verifications
- Return on investment calculations for print programs
- Environmental concerns and calculations for print programs

Outcome #3: Design parts with excess stock on critical surfaces with the intention of reductive finishing to tolerance.

- Design for manufacturing for additive processes
- Design for manufacturing for multi-process manufacturing
- Geometry considerations for sacrificial stock
- Machine offsets for additive
- Software offsets for additive
- Tolerances compared with sacrificial stock

Outcome #4: Meet tight tolerances by finishing AM parts with precision reductive machining methods

- Offsets needed for post processing
- Offsets needed for different modalities
- Material dependent offsets for tolerance
- Modality dependent offsets for tolerance
- Check geometrical offsets as printed
- Find offset density
- Verify quality to tolerance
- Post machining and verification

Outcome #5: Document production methods, printing times, and material usage to include in return-on-investment calculations

- Log related data points in SLS, SLA and FDM printing
- Systematic logging of necessary information
- Data capture streams
- Automated data tracking and streams
- Software usage to determine costing and return on investment
- Capital equipment options and return on investment for printing modalities
- Printing at scale return on investment

Suggested Texts & Materials (specify if any texts or materials are required)	Use of listed Texts/Materials is not required unless so noted. • EOS Ignite Design for Additive Manufacturing • EOS Ignite Data Preparation • EOS Additive Academy Safety • Materials Properties for 3d Printing • Blender 3d Modeling Manual • 3d Part Generation Principles • Additive Manufacturing of Metal Parts • Additive Manufacturing Fundamentals • Stratasys E-Book on AM • https://www.ntop.com/resources/blog/what-is-design-for-additive-manufacturing/
Department Notes (optional)	Safety glasses are required at all times in the manufacturing lab, and are provided for students. Students may also purchase their own safety glasses from a local supplier. Long pants and closed toed shoes are required in the manufacturing labs at all times. Appropriate clothing must be worn to work in the lab (no synthetic materials, ect.). Safety requirements are covered prior to work in the lab.

SECTION #2 FUNCTION OF COURSE WITHIN EXISTING AND/OR NEW PROGRAM(S)		
New CTE courses must be attached to a degree and/or certificate. They cannot be offered until the degree or certificate is approved. Please answer below, as appropriate.		
Will this new course be part of existing, currently approved CGCC certificate(s) and/or degree(s)?		☒ Yes ☐ No
Name of certificate(s):		# credit:
Name of degree(s):		# credit:
Will this new course be part of a new, proposed CGCC certificate or degree?		☒ Yes ☐ No
Name of new certificate(s):	Additive Manufacturing Processes	# credit: 36
Name of new degree(s):	CNC and Additive Manufacturing Fabrication and Additive Manufacturing	# credit: 92, 96
Briefly explain how this course fits into the new or existing degrees /certificates noted above (i.e. requirement or elective):	requirement	
Is this course used to supply related instruction for a certificate?		☐ Yes ☒ No
If **yes,** the related instruction form, available on the curriculum office website, must be completed and submitted together with this form.		

SECTION #3 ADDITIONAL INFORMATION FOR NEW CTE COURSES	
Transferability: Will this course transfer to another academic institution? Identify and describe the nature of the transfer.	no

IMPACT ON OTHER PROGRAMS AND DEPARTMENTS	
Are there degrees and/or certificates that are affected by the instruction of this course? If so, provide details.	no
Are there similar courses existing in other programs or disciplines at CGCC? If yes, provide details and/or describe the nature of acknowledgments and/or agreements that have been reached.	no
Is there any potential impact on another department? Identify and consult with Department chairs whose courses may be impacted by this course, such as: content overlap, course duplication, prerequisite need, enrollment increase or decrease, etc.	☐ Yes ☒ No
Explain and/or describe the nature of acknowledgments and/or agreements that have been reached.	n/a
Has the Library director been notified regarding the addition of this course and the need for any potential resources?	☒ Yes – date: 10.27.25 ☐ No
Implementation term:	☒ Start of next academic year (summer term) ☐ Specific term (if BEFORE next academic year):
Course approval is dependent on approval of the related certificate/degree submission which documents the placement of the new course. Degree/certificate status will impact the speed of the process. The Curriculum Office will notify the submitter, department chair, and department director when the course has completed the approval process and is available to be scheduled. Curriculum changes generally go into effect at the beginning of the next academic year (summer term). Mid-year revisions/additions are discouraged but accommodated when possible if there is a specific, identifiable need.	

SECTION #4 DEPARTMENT REVIEW

"I vouch that this submission has been reviewed by the affiliated department chair and department dean/director and that they have given initial authorization for this submission. I am requesting that it be placed on the next Curriculum Committee agenda with available time slots. I understand that I am required to complete and submit, prior to the day my submission is reviewed by the Curriculum Committee, a Course Signature Form signed by the department chair and dean/director."

Submitter	Email	Date
Robert Wells-Clark	rclark@cgcc.edu	10.28.25
Department Chair (enter name of department chair): Jim Pytel		
Department Dean/Director (enter name of department dean/director): Jarett Gilbert		

NEXT STEPS:

CC date	11.5.25
CC decision	_____
CC vote	_____

Columbia Gorge Community College

NEW CERTIFICATE REQUEST

Submitted by: Robert Wells-Clark	Email: rclark@cgcc.edu	Phone: 541-514-1589	Department: Tech & Trades: Manufacturing

(Double click on check boxes to activate dialog box)

SECTION #1 OVERVIEW

Proposed Title:	Additive Manufacturing Processes			Proposed Credits:	36
Reason for new certificate:	Stemming from industry related demand for proactive and waste-reductive processes in more modern manufacturing principles. Students code and operate additive machines that represent the future of manufacturing technologies, as well as integrate existing manufacturing technologies.			Requested implementation term:	Fall 2026
Is there impact on other areas of instruction?	☐ Yes ☒ No	Explanation of issues and how they are being resolved:		Has the certificate been validated by the Advisory Committee?	☒ Yes ☐ No
If yes, have you talked with impacted departments and resolved any and all possible issues?	☐ Yes ☐ No			Date of Advisory Committee meeting:	10.6.25

Is this a Statewide Certificate?	☐ Yes ☒ No	If so, has the certificate been approved by the consortium?	☐ Yes ☐ No
Is this a Related Certificate?	☒ Yes ☐ No	Is this a Career Pathway?	☐ Yes ☒ No
If this is a Related Certificate or a Career Pathway, what is the base degree?	CNC and Additive Manufacturing AAS Fabrication and Additive Manufacturing AAS		

SECTION #2 PREREQUISITES AND OUTCOMES			
Note that degree/certificate/program entry prerequisites are only enforceable in limited entry programs. Program prerequisites for open entry programs only have meaning when they are representative of prerequisites associated to specific courses within the program. Prerequisites that students are not able to test out of using multiple measures result in hidden degree/certificate requirements and should be avoided. (Courses that may be tested out of using multiple measures include: WR 115, MTH 65, MTH 95, MTH 98, MTH 105, MTH 111, MTH 112.)			
PROPOSED PRE and/or COREQUISITES			
Course Number	**Course Title or Placement level**	**Requisites**	**Credits**
	none		
Is this a limited entry program? Students must apply, via the department for program entry.			☐ Yes ☒ No
PROPOSED OUTCOMES			
Describe what the student will be able to do "out there" (in their life roles as worker, family member, community citizen, global citizen or lifelong learners). Outcomes must be measurable through the application of direct and/or indirect assessment strategies. Three to six outcomes are recommended. Start each outcome with an active verb, completing the sentence starter provided. (See Writing Learning Outcomes on the curriculum website.)			
Students who successfully complete this certificate will be able to:			
1. Successfully design and redesign parts for additive manufacturing processes.			
2. Operate additive manufacturing equipment and the supporting processes necessary.			
3. Post process and check parts additively manufactured for quality.			
4. Apply health and safety handling practices when working with additive manufacturing equipment and materials.			
5. Program additive manufacturing equipment for repeatable serial production of parts.			
6. Demonstrate knowledge of mixed process manufacturing for tight tolerance parts.			

SECTION #3 PROPOSED COURSEWORK			
List all courses (course number, title, requisites and credits) in the term by term order that is to be displayed in the catalog certificate map. Enter electives below if applicable. The information you provide on this form will be reflected in the CGCC catalog pages. Please ensure it is correct. (If you need more lines to accommodate the courses, right click and insert rows.)			
Course Number	**Course Title**	**Requisites**	**Credits**
Fall Term (12 credits)			
MFG130	Fused Deposition Modeling Additive Manufacturing	None	3
MFG240	Design for Additive Manufacturing	None	3
MFG250	Metal Additive Manufacturing 1	None	3
MFG260	Metrology for Additive Manufacturing	None	3

Winter Term (12 credits)			
MFG131	SLA / LCD / DLP Additive Manufacturing	None	3
MFG241	Prototyping and Production using Additive Methods	None	3
MFG251	Metal Additive Manufacturing 2	Pre: MFG 250	3
MFG261	Iterative Production Manufacturing for Additive Manufacturing	None	3
Spring Term (12 credits)			
MFG132	SLS and Polymer Powder Bed Fusion Additive Manufacturing	None	3
MFG242	Scanning and Design to Fit	None	3
MFG252	Metal Additive Manufacturing 3	Pre: MFG 251	3
MFG262	Multi-Process and Production Manufacturing	None	3
		Credit total	36
ELECTIVES (if applicable)			
Course Number	**Course Title**	**Requisites**	**Credits**
	none		

SECTION #4 RELATED INSTRUCTION

Certificates 45 credits or more require related instruction. Fill out a Template for Related Instruction located on the Curriculum web page.
All courses identified as fulfilling the embedded related instruction requirement must have been reviewed and recommended by the Curriculum Committee and the details outlined on the CCOG.

SECTION #5 DEPARTMENT REVIEW

"I vouch that this submission has been reviewed by the affiliated department chair and department dean/director and that they have given initial authorization for this submission. I am requesting that it be placed on the next Curriculum Committee agenda with available time slots. I understand that I am required to complete and submit, prior to the day my submission is reviewed by the Curriculum Committee, a Degree or Certificate Signature Form signed by the department chair and dean/director."

Submitter	Email	Date
Robert Wells-Clark	rclark@cgcc.edu	10.30.25
Department Chair (enter name of department chair): Jim Pytel		
Department Dean (enter name of department dean/director): Jarett Gilbert		

CC date	11.5.25
CC decision	_____
CC vote	_____

Columbia Gorge Community College

NEW DEGREE REQUEST Check one: ☒ AAS ☐ AS ☐ ASOT ☐ MTM

Submitted by: Robert Wells-Clark	Email: rclark@cgcc.edu	Phone: 541-514-1589	Department: Tech & Trades: Manufacturing

(Double click on check boxes to activate dialog box)

SECTION #1 OVERVIEW

Proposed Title:	CNC and Additive Manufacturing		Proposed Credits:	90
Reason for new degree:	A combination of one new certificate with an already approved manufacturing certificate. Stemming from industry related demand for proactive and waste-reductive processes in more modern manufacturing principles; with a core of traditional manufacturing methodologies. This degree combines additive techniques with reductive manufacturing processes to create more efficient workflows in manufacturing. Students can start with either the Additive Manufacturing Certificate or the CNC Manufacturing and Quality Control Processes to complete this AAS.		Requested implementation term:	Fall 2026
Is there impact on other areas of instruction?	☐ Yes ☒ No	Explanation of issues and how they are being resolved:	Has the degree been validated by the Advisory Committee?	☒ Yes ☐ No
If yes, have you talked with impacted departments and resolved any and all possible issues?	☐ Yes ☐ No		Date of Advisory Committee meeting:	10.6.25

Is this a Statewide Degree?	☐ Yes ☒ No	If so, has the degree been approved by the consortium?	☐ Yes ☐ No
Are there Related Certificates or Career Pathways associated with this degree?	☒ Yes ☐ No	• Additive Manufacturing Processes • CNC Manufacturing and Quality Control Processes	

SECTION #2 REQUISITES AND OUTCOMES

Note that degree/certificate/program entry prerequisites are only enforceable in limited entry programs. Program prerequisites for open entry programs only have meaning when they are representative of prerequisites associated to specific courses within the program. Prerequisites that students are not able to test out of using multiple measures result in hidden degree/certificate requirements and should be avoided. (Courses that may be tested out of using multiple measures include: WR 115, MTH 65, MTH 95, MTH 98, MTH 105, MTH 111, MTH 112.)

PROPOSED PRE and/or COREQUISITES

Course Number	Course Title or Placement level	Requisites	Credits
MTH 65 ***or*** MTH 98	Beginning Algebra ***or*** Quantitative Math ***or*** equivalent placement	Placement into MTH 65 or MTH 98	4
IRW 115 ***or*** WR 115	Integrated Reading & Writing ***or*** Introduction to Expository Writing ***or*** equivalent placement	Placement into IRW 115 or WR 115	5 4
Is this a limited entry program? Students must apply, via the department for program entry.			☐ Yes ☒ No

PROPOSED OUTCOMES

Describe what the student will be able to do "out there" (in their life roles as worker, family member, community citizen, global citizen or lifelong learners). Outcomes must be measurable through the application of direct and/or indirect assessment strategies. Three to six outcomes are recommended. Start each outcome with an active verb, completing the sentence starter provided. (See Writing Learning Outcomes on the curriculum website.)

Students who successfully complete this degree will be able to:

1. Demonstrate knowledge of basic CNC operations and G code.
2. Generate product designs and blueprints using CAD software.
3. Apply metallurgical concepts and material science as they pertain to polymers and metals, creating better production results in manufacturing processes.
4. Combine additive manufacturing techniques with traditional reductive manufacturing strategies and demonstrate application benefits that necessitate use of additive manufacturing.
5. Create and modify component designs to be produced with regard to reductive manufacturing strategies and develop production processes to produce them in accordance to blueprints.
6. Create new and modify existing blueprints for production stages using additive manufacturing strategies for reductive manufacturing processes.

7. Use critical thinking and problem-solving skills to create more efficient systems of manufacturing.
8. Apply health and safety handling practices when working with additive manufacturing equipment and materials.

SECTION #3 PROPOSED COURSEWORK

All candidates for the Associate of Applied Science (AAS) Degree must complete 16 credits of General Education from the General Education/Discipline Studies list. The categories are: 1) Arts and Letters, 2) Social Science, and 3) Science/Math/Computer Science. These credits must include at least one course from each category and no more than two courses or eight credits from any one category. For information regarding Gen Ed requirements for the AS, ASOT and for MTM majors, please contact the Curriculum Office.

List all courses in the term by term order that is to be displayed in the catalog degree map. Include elective list below. The information you provide on this form will be reflected in the CGCC catalog pages. Please ensure it is correct. (If you need more lines to accommodate the courses, right click and insert rows.)

Course Number	Course Title	Requisites	Credits
Fall, Year 1 (14 credits)			
MFG 210	Introduction to Computer Aided Design and Tolerancing	None	3
MFG 220	Production Manufacturing 1	None	3
MFG 230	Metrology 1	None	3
MTH 105Z	Math in Society	MTH 65 or MTH 98 or equiv placement; placement into WR115	4
MTH 105Q	Corequisite for Math in Society	Coreq: MTH 105Z	1
Winter, Year 1 (15 credits)			
MFG 211	CAD Design for CNC Manufacturing 1	MFG 210	3
MFG 221	Production Manufacturing 2	MFG 221	3
MFG 231	Metrology 2	MF 230	3
WR 121 or WR 121Z	Composition I	IRW 115 or WR 115 or equiv placement	4
WR 121Q	Corequisite for Composition I	Coreq WR 121 or WR 121Z	1
CG 209	Job Finding Skills	None	1
Spring, Year 1 (13 credits)			

MFG 212	CAD Design for CNC Manufacturing 2	MFG 211	3
MFG 222	Production Manufacturing 3	MFG 221	3
MFG 232	Metrology 3	MFG 231	3
MFG 290	Student Production Lab	Pre/Co MFG 212, 222	4
Fall, Year 2 (16 credits)			
MFG 130	Fused Deposition Modeling Additive Manufacturing	None	3
MFG 240	Design for Additive Manufacturing	None	3
MFG 250	Metal Additive Manufacturing 1	None	3
MFG 260	Metrology for Additive Manufacturing	None	3
	General Education Elective	MTH 65 or MTH 98; Pre-Co WR 121 or WR 121Z	4
Winter, Year 2 (16 credits)			
MFG 131	SLA / LCD / DLP Additive Manufacturing	None	3
MFG 241	Prototyping and Production using Additive Methods	None	3
MFG 251	Metal Additive Manufacturing 2	Pre: MFG 250	3
MFG 261	Iterative Production Manufacturing for Additive Manufacturing	None	3
	General Education Elective	MTH 65 or MTH 98; Pre-Co WR 121 or WR 121Z	4
Spring, Year 2 (16 credits)			
MFG 132	SLS and Polymer Powder Bed Fusion Additive Manufacturing	None	3
MFG 242	Scanning and Design to Fit	None	3
MFG 252	Metal Additive Manufacturing 3	Pre: MFG 251	3
MFG 262	Multi-Process and Production Manufacturing	None	3
	General Education Elective	MTH 65 or MTH 98; Pre-Co WR 121 or WR 121Z	4
		Credit total	90
ELECTIVES (if applicable)			
Course Number	**Course Title**	**Requisites**	**Credits**

	none		

SECTION #4 DEPARTMENT REVIEW		
"I vouch that this submission has been reviewed by the affiliated department chair and department dean/director and that they have given initial authorization for this submission. I am requesting that it be placed on the next Curriculum Committee agenda with available time slots. I understand that I am required to complete and submit, prior to the day my submission is reviewed by the Curriculum Committee, a Degree or Certificate Signature Form signed by the department chair and dean/director."		
Submitter	Email	Date
Robert Wells-Clark	rclark@cgcc.edu	10.30.25
Department Chair (enter name of department chair): Jim Pytel		
Department Dean/Director (enter name of department dean/director): Jarett Gilbert		

Next steps:

1. Save the completed New Degree Request Form and submit as an e-mail attachment to curriculum@cgcc.edu or slewis@cgcc.edu.
2. Refer to the curriculum office website for the Curriculum Committee meeting schedule and submission deadlines. You are encouraged to send submissions prior to the deadline so that the Curriculum Office may review and provide feedback.
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CC date	11.5.25
CC decision	_____
CC vote	_____

Columbia Gorge Community College

NEW DEGREE REQUEST Check one: ☒ AAS ☐ AS ☐ ASOT ☐ MTM

Submitted by: Robert Wells-Clark	Email: rclark@cgcc.edu	Phone: 541-514-1589	Department: Tech & Trades: Manufacturing

(Double click on check boxes to activate dialog box)

SECTION #1 OVERVIEW

Proposed Title:	Fabrication and Additive Manufacturing		Proposed Credits:	95
Reason for new degree:	A combination of one new certificate with an already approved manufacturing certificate. Stemming from industry related demand for proactive and waste-reductive processes in more modern manufacturing principles; with a core of traditional manufacturing methodologies. This degree combines additive techniques with welding skill sets and flat panel part fabrication to create more efficient workflows in manufacturing. Students can start with either the Additive Manufacturing Certificate or the Advanced Manufacturing Technology Certificate to complete this AAS.		Requested implementation term:	Fall 2026
Is there impact on other areas of instruction?	☐ Yes ☒ No	Explanation of issues and how they are being resolved:	Has the degree been validated by the Advisory Committee?	☒ Yes ☐ No
If yes, have you talked with impacted departments and resolved any and all possible issues?	☐ Yes ☐ No		Date of Advisory Committee meeting:	10.6.25

Is this a Statewide Degree?	☐ Yes ☒ No	If so, has the degree been approved by the consortium?	☐ Yes ☐ No
Are there Related Certificates or Career Pathways associated with this degree?	☒ Yes ☐ No	• Additive Manufacturing Processes • Advanced Manufacturing Technology	

SECTION #2 REQUISITES AND OUTCOMES

Note that degree/certificate/program entry prerequisites are only enforceable in limited entry programs. Program prerequisites for open entry programs only have meaning when they are representative of prerequisites associated to specific courses within the program. Prerequisites that students are not able to test out of using multiple measures result in hidden degree/certificate requirements and should be avoided. (Courses that may be tested out of using multiple measures include: WR 115, MTH 65, MTH 95, MTH 98, MTH 105, MTH 111, MTH 112.)

PROPOSED PRE and/or COREQUISITES

Course Number	Course Title or Placement level	Requisites	Credits
MTH 65 ***or*** MTH 98	Beginning Algebra ***or*** Quantitative Math ***or*** equivalent placement	Placement into MTH 65 or MTH 98	4
IRW 115 ***or*** WR 115	Integrated Reading & Writing ***or*** Introduction to Expository Writing ***or*** equivalent placement	Placement into IRW 115 or WR 115	5 4
Is this a limited entry program? Students must apply, via the department for program entry.			☐ Yes ☒ No

PROPOSED OUTCOMES

Describe what the student will be able to do "out there" (in their life roles as worker, family member, community citizen, global citizen or lifelong learners). Outcomes must be measurable through the application of direct and/or indirect assessment strategies. Three to six outcomes are recommended. Start each outcome with an active verb, completing the sentence starter provided. (See Writing Learning Outcomes on the curriculum website.)

Students who successfully complete this degree will be able to:

1. Demonstrate knowledge of basic CNC operations and G code.
2. Manufacture product from conceptualization to reality through research and development.
3. Apply metallurgical concepts and material science as they pertain to polymers and metals, creating better production results in manufacturing processes.
4. Combine additive manufacturing techniques with traditional fabrication strategies and demonstrate application benefits that necessitate use of additive manufacturing.
5. Create and modify component designs to be produced with regard to fabrication strategies and develop production processes to produce them in accordance to blueprints.
6. Create new and modify existing blueprints for production stages using additive manufacturing strategies for fabrication processes.

7. Use critical thinking and problem-solving skills to create more efficient systems of manufacturing.
8. Apply health and safety handling practices when working with additive manufacturing equipment and materials.

SECTION #3 PROPOSED COURSEWORK

All candidates for the Associate of Applied Science (AAS) Degree must complete 16 credits of General Education from the General Education/Discipline Studies list. The categories are: 1) Arts and Letters, 2) Social Science, and 3) Science/Math/Computer Science. These credits must include at least one course from each category and no more than two courses or eight credits from any one category. For information regarding Gen Ed requirements for the AS, ASOT and for MTM majors, please contact the Curriculum Office.

List all courses in the term by term order that is to be displayed in the catalog degree map. Include elective list below. The information you provide on this form will be reflected in the CGCC catalog pages. Please ensure it is correct. (If you need more lines to accommodate the courses, right click and insert rows.)

Course Number	Course Title	Requisites	Credits
Fall, Year 1 (18 credits)			
MFG 195	Welding Technology 1	None	3
MFG 150	Manufacturing Processes	Pre/Co: MFG 195	3
MFG 155	Blueprint Reading	Pre/Co: MFG 195	3
MTH 105Z	Math in Society	MTH 65 or MTH 98 or equiv placement; placement into WR 115	4
WR 121 or WR 121Z	Composition I	IRW 115 or WR 115 or equiv placement	4
WR 121Q	Corequisite for Composition 1	Coreq WR 121 or WR 121Z	1
Winter, Year 1 (15 credits)			
MFG 151	Fabrication Processes 1	MFG 150	3
MFG 156	Integrated Manufacturing	MFG 155	3
MFG 280	Aluminum GTAW/TIG Welding	MFG 195, MFG 150	3
MFG 281	Aluminum GTAW/TIG Fabrication 1	Co – MFG 280	3
MFG 285	Stainless Steel GTAW/TIG Welding	MFG 195, MFG 150	3
Spring, Year 1 (15 credits)			
MFG 152	Fabrication Processes 2	MFG 151	3
MFG 157	Integrated Manufacturing 2	MFG 156	3
MFG 282	Aluminum GTAW/TIG Fabrication Processes 2	MFG 281	3

MFG 286	Stainless Steel GTAW/TIG Fabrication 1	MFG 285	3
MFG 287	Stainless Steel GTAW/TIG Fabrication 2	Coreq: MFG 286	3
Fall, Year 2 (15 credits)			
MFG 130	Fused Deposition Modeling Additive Manufacturing	None	3
MFG 240	Design for Additive Manufacturing	None	3
MFG 250	Metal Additive Manufacturing 1	None	3
MFG 260	Metrology for Additive Manufacturing	None	3
	General Education Elective: Arts & Letters	MTH 65 or MTH 98; Pre-Co WR 121 or WR 121Z	3
Winter, Year 2 (16 credits)			
MFG 131	SLA / LCD / DLP Additive Manufacturing	None	3
MFG 241	Prototyping and Production using Additive Methods	None	3
MFG 251	Metal Additive Manufacturing 2	Pre: MFG 250	3
MFG 261	Iterative Production Manufacturing for Additive Manufacturing	None	3
	General Education Elective	MTH 65 or MTH 98; Pre-Co WR 121 or WR 121Z	4
Spring, Year 2 (16 credits)			
MFG 132	SLS and Polymer Powder Bed Fusion Additive Manufacturing	None	3
MFG 242	Scanning and Design to Fit	None	3
MFG 252	Metal Additive Manufacturing 3	Pre: MFG 251	3
MFG 262	Multi-Process and Production Manufacturing	None	3
	General Education Elective	MTH 65 or MTH 98; Pre-Co WR 121 or WR 121Z	4
		Credit total	95
ELECTIVES (if applicable)			
Course Number	**Course Title**	**Requisites**	**Credits**
	none		

SECTION #4 DEPARTMENT REVIEW		
"I vouch that this submission has been reviewed by the affiliated department chair and department dean/director and that they have given initial authorization for this submission. I am requesting that it be placed on the next Curriculum Committee agenda with available time slots. I understand that I am required to complete and submit, prior to the day my submission is reviewed by the Curriculum Committee, a Degree or Certificate Signature Form signed by the department chair and dean/director."		
Submitter	Email	Date
Robert Wells-Clark	rclark@cgcc.edu	10.30.25
Department Chair (enter name of department chair): Jim Pytel		
Department Dean/Director (enter name of department dean/director): Jarett Gilbert		

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