Statewide Model Programs of Study

Manufacturing and Engineering

Thank you for joining! We will get started shortly.



Agenda

Quick Notes:

- Highly encourage
 Q&A and Chat Box
- This webinar is being recorded
- Slide deck will be linked in the chat

- Welcome from ICCB and EdSystems
- Background on Model POS Guides
 - Policy Alignment
 - Role of Advisory Committee
- Model POS Mapping Process
- Review of POS Guide for Manufacturing and Engineering
- POS in Action: Rock Valley College
- Feedback and Next Steps





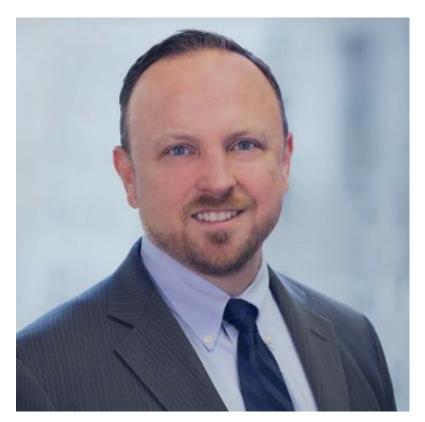
Welcome from Illinois Community College Board



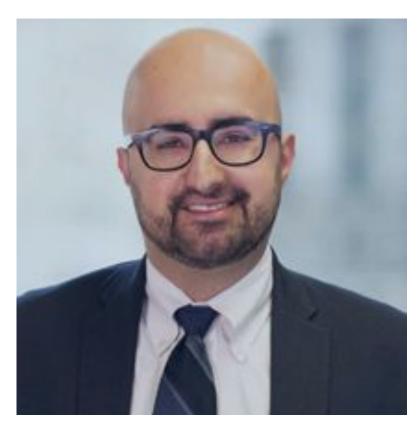
Janelle Washington
Director for CTE



EdSystems Staff



Jon Furr Executive Director



Juan Jose Gonzalez Pathways Director



Meagan Mitchell Pathways Manager



The EdSystems Mission

Shape and strengthen education and workforce systems to advance racial equity and prepare more young people for productive careers and lives in a global economy.



College & Career Pathways



Bridges to Postsecondary



Data Impact & Leadership







Background on Model Programs of Study



Why Develop Statewide Model Programs of Study?

The primary purposes and goals for the Model Programs of Study Guides are to:

- Provide guidance and exemplars for local programs to adopt or customize as they develop programs of study for approval as part of the Perkins V Plan.
- Identify priority dual credit and early college courses that are foundational to the industry area and well-situated for statewide scaling and articulation.
- Define the competencies that should be sequenced across a program of study course sequence to prepare students for the future of work in that industry area.
- Identify entry points for employers to support coursework and related experiences.



Why Develop Statewide Model Programs of Study? Pt. 2

Intended audiences:

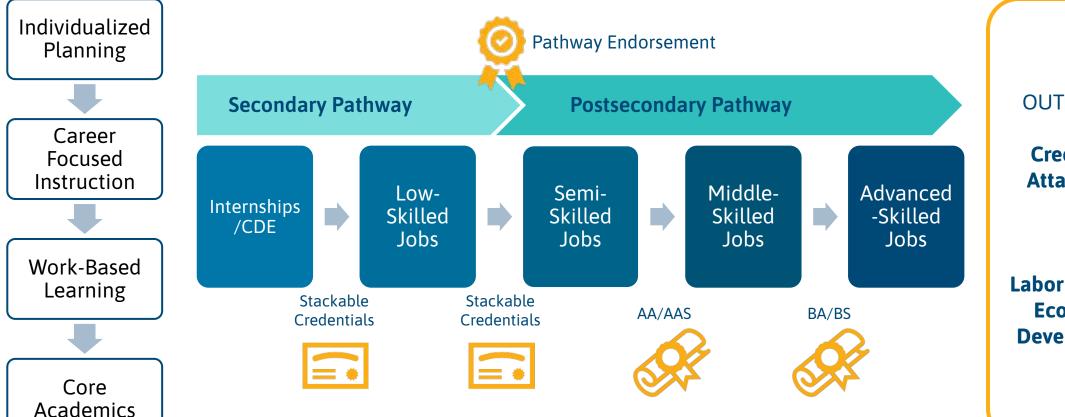
- High school faculty working in pathways
- Community College faculty and staff (e.g. academic deans & department heads, early college liaisons, etc.)
- Education for Employment System Directors

Subsequent Presentations

- November = Manufacturing and Engineering
- January = Information Technology
- February = Agriculture, Food, and Natural Resources



State Pathways Model



OUTCOMES:

Credential Attainment

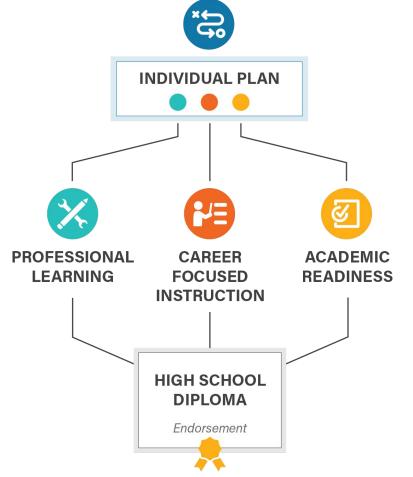
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Labor Market /
Economic
Development





College and Career Pathway Endorsement Framework



INDIVIDUAL PLAN

Each student completing an endorsement must have an individualized plan, which includes college planning linked to early understanding of career goals, financial aid, resume, and personal statement.

PROFESSIONAL LEARNING

Awareness, exploration, and preparation activities that provide opportunities for students to interact with adults in their workplace

9th | 10th | 11th | 12th

At least 2 career exploration activities or 1 intensive experience | 60 cumulative hours of paid or credit supervised career development experience with a professional skills assessment

At least 2 team-based challenges with adult mentoring

Through these experiences, a student gains essential employability and technical competencies in their identified sector.

CAREER-FOCUSED INSTRUCTIONAL SEQUENCE

Two years of secondary coursework, or equivalent competencies, that articulate to a postsecondary credential with labor market value. Must include at least 6 hours of early college credit.

9th | 10th | 11th | 12th

Orientation / Introduction

Skill Development

Capstone / Advanced Courses

ACADEMIC READINESS

Ready for non-remedial coursework in reading and math by high school graduation through criteria defined by district and local community college

Policy Alignment



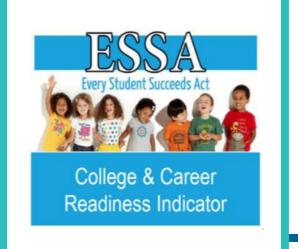




TEACH ILLINOIS STRONG TEACHERS, STRONG CLASSROOMS

POLICY SOLUTIONS TO ALLEVIATE TEACHER SHORTAGES IN ILLINOIS SEPTEMBER 2018

ILLINOIS STATE BOARD OF EDUCATION







State Pathways Policy Framework: College, Career and Life Ready

Accelerated Towards a Career Area

- Multiple years of coursework, increasing commitment to the field
- Emphasis on Early college coursework in "Career-focused" subjects
- Courses go Beyond
 Traditional High School
 CTE and Industry
 Credentials, include
 Complementary General
 Education Courses

Academically Ready for College

- Required success in College-Level, career-focused coursework and electives
- Required placement college-level placement in Math and English (through collaboration with local Community College)

Foundational Skills for All Careers

- General employability and entrepreneurial skills embedded in HS experience
- Student have a familiarity with work-based setting and robust experience in problem-based learning





2020 Guides

- Education
- Health Sciences
- Information Technology
- Manufacturing and Engineering

edsystemsniu.org/guides

2021 Guides

- Agriculture, Food and Natural Resources
- Architecture, Construction and Energy
- Arts and Communications
- Finance and Business Services





Role of Advisory Committee

Expertise and guidance:

- What are trends in the industry that aren't reflected in Labor Market Information?
- What credentials/degrees are emerging as most promising in the field?
- How does our desk analysis relate to on-the-ground implementation?
- What are future of work implications for this sector?

Inform key decision-points in this process:

- Pathway map approach
- Selecting strategic early college credit courses
- Identifying key competencies (building from existing State technical competencies)



Mapping Process



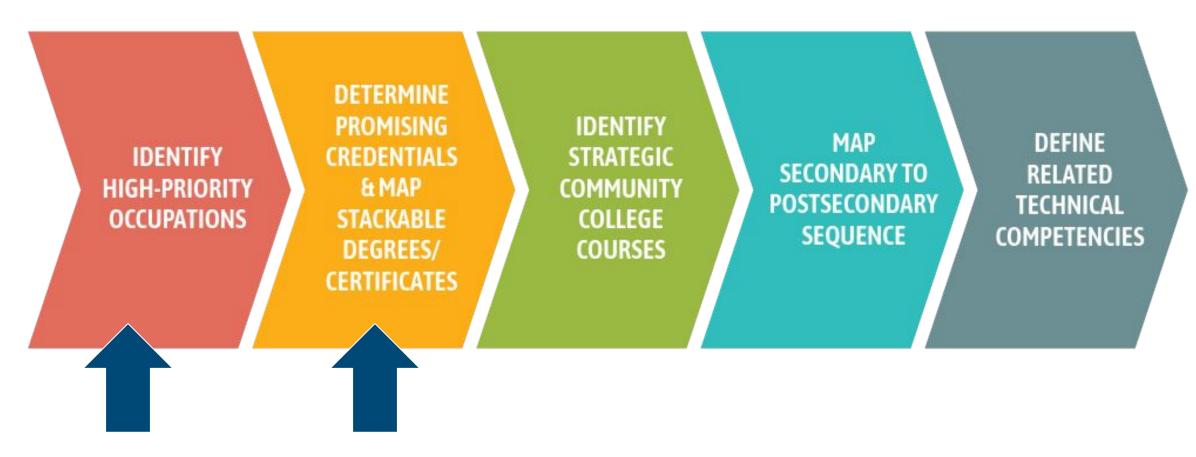
Model Programs of Study Mapping Process



6 month process



Model Programs of Study Mapping Process







High Priority Occupations & Promising Credentials

- Using Department of Labor data and the MIT Living Wage Calculator for the State of Illinois as a reference, High Priority Occupation defined
 - Occupations with a positive growth outlook and
 - Occupations whose salaries are near or greater than the "Living Wage" of 1 Adult + 1 Child in Illinois.
- A "promising credential" is a degree or college certification that immediately prepares an individual for entry into a high-priority occupation, with a focus on credentials available in typical Illinois Community College.
 - Credential may also be is a clear precursor to or stackable credential for a high-priority occupation



| Finance/Business Example | Median Wage Hourly | Living Wage? | Growth? | Entry Education | Annual Job Openings | Percentage Growth (2016-2026) |
|--|--------------------|--------------|---------|-----------------------------------|------------------------|----------------------------------|
| Accountants and Auditors | 33.89 | Yes | Yes | Bachelor's Degree | 5,510 | 8% |
| Business Operations Specialist | 36.81 | Yes | Yes | Bachelor's Degree | | |
| <u>Financial Analyst</u> | 39.29 | Yes | Yes | Bachelor's Degree | 1,310 | 7% |
| <u>Actuary</u> | 49.34 | Yes | Yes | Bachelor's Degree | 140 | 23% |
| Market Research Analysts and Marketing Specialists | 29.15 | Yes | Yes | Bachelor's Degree | 2960 | 22% |
| Human Resource Specialist | 28.79 | Yes | Yes | Bachelor's Degree | 2230 | 6% |
| First-Line Supervisor of Retail Sales Workers | 18.74 | No | Yes | High school diploma | 5,620 | 3% |
| First-Line Supervisor of Office & Administrative Support Workers | 28.3 | Yes | No | High school diploma | 4,450 | 0% |
| First-Line Supervisor of Non-Retail Sales Workers | 34.04 | Yes | Yes | High school diploma | 1,070 | 3% |
| Human Resource Assistant | 19.49 | No | No | Postsecondary nondegree award | 380 | -4% |
| Lodging Manager | 21.62 | No | Yes? | High school diploma or equivalent | 180 | 9% |
| Insurance Claims and Policy Processing Clerks | 19.94 | No | Yes | High school diploma or equivalent | 1090 | 10% |

Common CC Programs

Guided Transfer

- Business AA**^^
- Accounting AA**^^
- Actuary AA^{^^}

Business AAS, with specialities/certs^^

- General,**
- Insurance,
- HR,**
- Entrepreneurship,**
- Management,**
- Marketing,**
- Hospitality**

Supply Chain

Supply Chain AAS, AA/AS^{^^}

Accounting

Accounting AAS**^^

Leading to Occupations/Careers

Entry Level Bachelor's Degree Positions

- Business Operations Specialist OR Financial Analyst OR Market Research Analysts OR Human Resource Specialist
- Accountants and Auditors
- Actuary

Small/Local Business

- First-Line Supervisor of Retail Sales Workers OR Office & Administrative Support Workers OR First-Line Supervisor of Non-Retail Sales Workers
- Human Resource Assistant OR Lodging Manager OR Insurance Claim Clerk

Supply Chain

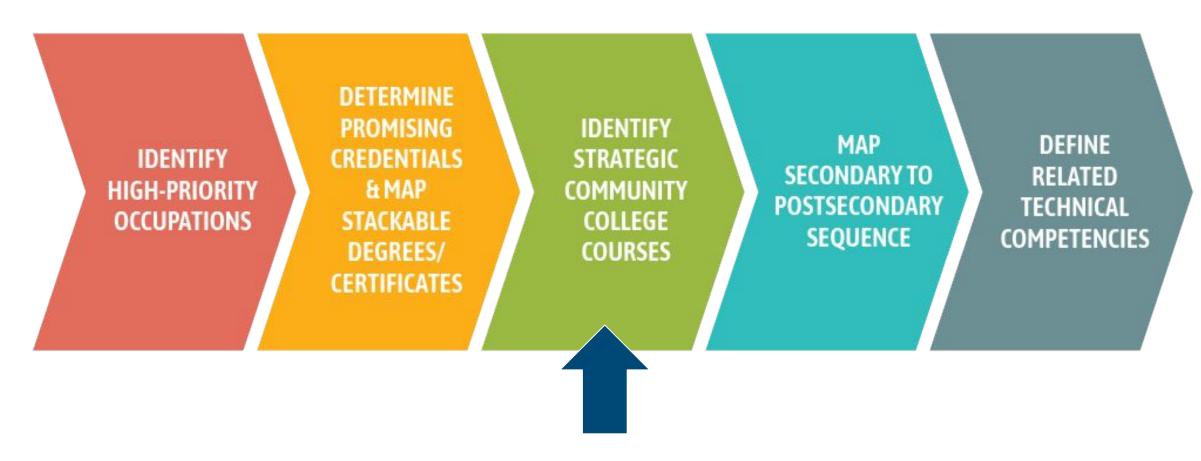
 Supply Chain Manager OR Production, Planning, & Expediting Clerks

Clerk Roles

 Payroll & Timekeeping, OR, Bookkeeping, Accounting, & Auditing Clerk, OR Billing and Posting Clerks

^{**} Aligns with ISBE CTE Program of Study Matrix

Model Programs of Study Mapping Process





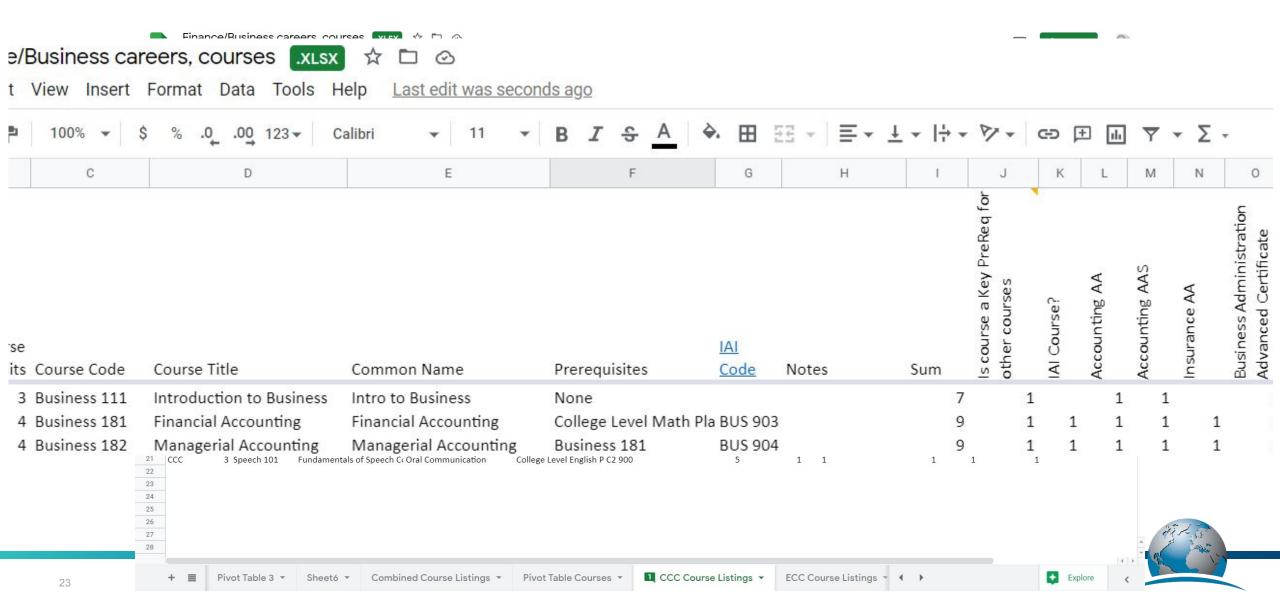


Identify Strategic Community College Courses

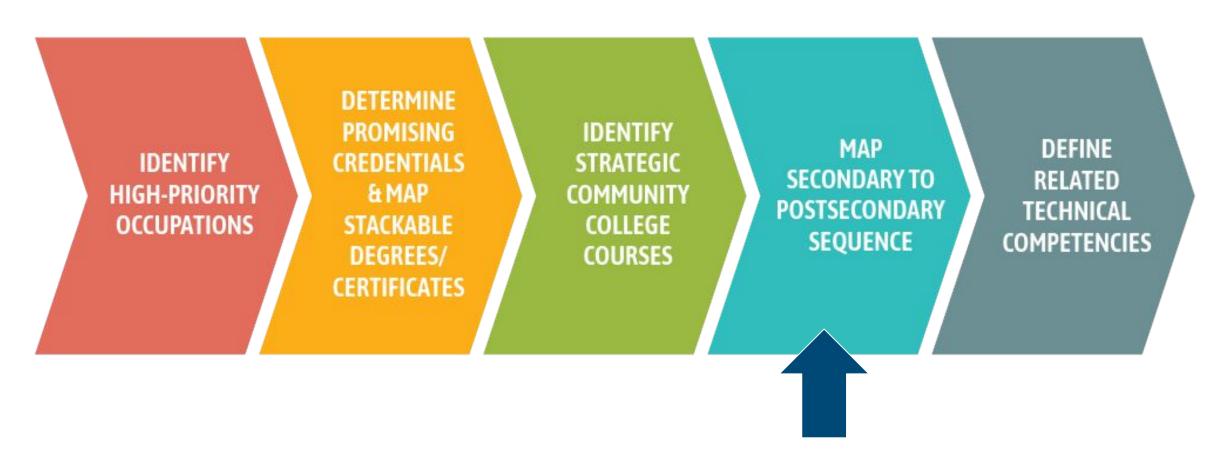
- Analyze "promising credential" program requirements at various Community Colleges in the state
- Tally and label all of the "career-focused" & "general education" courses across programs to determine which of these courses:
 - Are most common across targeted programs,
 - Are more likely accessible for dual credit, and
 - Have the potential for transferability and currency (through the Illinois Articulation Initiative) or have industry credentials



Identify Strategic Community College Courses



Model Programs of Study Mapping Process







Map Secondary to Postsecondary Sequence

- Recommend early college courses reasonably accessible to HS students, goal is to at least get 6+ career-focused credit hours by HS graduation
- Keep open possibility for unique opportunities, i.e. work-based learning or capstone course
- Consider typical teacher and faculty credentials, as well as course delivery and approval processes
- Suggest initial post secondary courses and sequences that continue to accelerate student
- Recommend sequence in general education subject areas, including early college and AP supplements

Model Programs of Study Mapping Process







Define Related Technical Competencies for Key Courses

- Select foundational courses in each Model Programs of Study area
 - Courses map to multiple credentials within the industry area,
 - Can be accessed for early college credit at secondary level, and
 - Not currently recognized by the IL Articulation Initiative (IAI)
- Determine a set of technical competencies for each course (i.e. learning objectives)



State of Illinois Model Programs of Study Guide: Manufacturing and Engineering

October 2020



Review of the Manufacturing and Engineering Guide









Dual **Dual Credit** Credit



Course

Dual Credit Course Affiliated With IAI Code







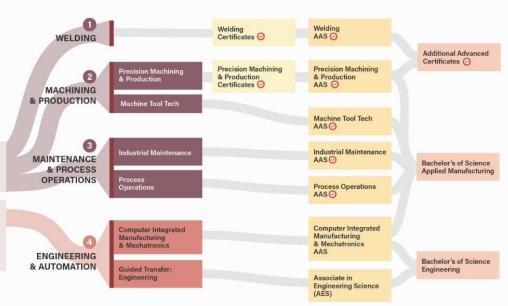
with IAI Code



Earned

If courses in this column were accomplished through early college credit, students should take the next required course in the sequence or, if none, additional AAS or Major Courses





SELECTED OCCUPATIONS, WAGES, & JOB GROWTH

| | Program | Typical Job | Near or Above Living Wage Threshold for 1 Adult + 1 Child ³ | Median Hourly Wage ⁴ | Growth in IL: Annual Job Openings ⁴ | Growth in IL: % Change Over 10 years ⁴ | Stackable? | |
|---|---|---|--|---------------------------------------|--|---|--|--|
| 1 | Welding | Welders, Cutters, Welder Fitters | N | \$19.28 | 1,540 | 5% | Not Typically Stackable | |
| 2 | Machine Tool Technology | Tool and Die Makers | Y | \$25.34 | 450 | -5% | Typically Stacks to Related Bachelor's Program at Select IL Universities | |
| | Precision Machining | Machinists | N | \$19.44 | 3,630 | 4% | Typically Stacks to Further Certificates or an AAS | |
| | | Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic | Y | \$25.65 | 160 | 18% | Typically Stacks to Related Bachelor's Program at Select IL Universities | |
| 3 | Industrial Maintenance | Industrial Machinery Mechanics | Y | \$26.41 | 1,240 | 10% | | |
| | Process Technology | Chemical Equipment Operators and Tenders, Biofuels Processing Technician | Y | \$24.95 - \$33.87 | 200 | 1% - 3% | | |
| 4 | Computer Integrated Manufacturing & Mechatronics | Manufacturing Engineering Technologists, Electromechanical Engineering Technologists, Robotics Technicians | Y | \$30.26 - \$30.48 | 460 | 5% | | |
| | Guided Transfer: Engineering | Engineers in Various Branches: Mechanical, Civil, Electrical, Chemical, Mechatronics, Industrial | Y | \$40.65 - \$44.51 | 3,760 | 4% - 12% | Typically Stacks to Related Bachelor's Program at Most IL Universities | |

- 1. For machining-focused programs, equivalent to ISBE CTE Courses Beginning Machining and Machine Shop Technology 1
- 2. For machining-focused programs, equivalent to ISBE CTE Course Machine Shop Technology II
- 3. Living wage calculations are based on MIT's Living Calculator (livingwage.mit.edu), where the "Living Wage" for 1 Adult + 1 Child is \$26.27/hour for the state of Illinois. "Near" defined as 85% of the statewide living wage, which is \$22.33/hour
- 4. U.S. Department of Labor, CareerOnestop (careeronestop.org/explorecareers)

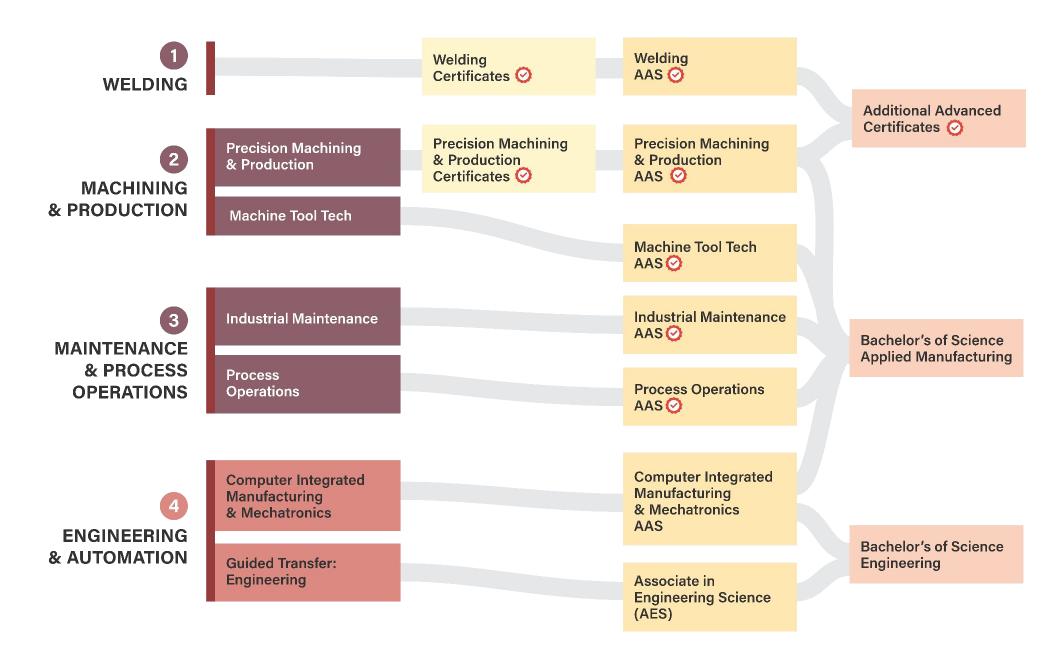


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ORIENTATION / INTRODUCTION

Grades 9-10

SKILL DEVELOPMENT

Grades 10-12

ADVANCED

CAPSTONE /

Grades 12



Recommended 1st Year



CAREER FOCUSED COURSES

Advanced Manufacturing & Engineering Pathway

Advanced Manufacturing Focus



Introduction to Technology & Engineering



Principles of Engineering >> Additional Engi



Computer Integrated MFG >> Additional Engineering >>



CAD / CAM Technology

Courses and Work-Based Learning Address the PWR Act Recommended Technical and Essential Employability Competencies



Career Exploration (2)

Team-Based Challenge



Team-Based Challenge

Career Development

Experience

or

Apprenticeship



AP or Dual Credit



Dual Credit Course



Dual Credit Course Affiliated With IAI Code



Course or Program Prepares for Industry Credential



Postsecondary Course Affiliated with IAI Code



College and Career Pathway Endorsement Earned



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ORIENTATION / INTRODUCTION

Grades 9-10

SKILL **DEVELOPMENT**

Grades 10-12

CAPSTONE / **ADVANCED**

Grades 12



Recommended 1st Year



Science Sequence Science Sequence Physics >>

General Physics 🖺

General Chemistry



Social Science Sequence

Social Science Sequence

Social Science >>

Social Science



 \sqrt{x}

MATH

Algebra

Geometry

Geometry

Algebra 2

Pre-Calculus

Transitional Math: Technical

Transitional Math: STEM

Pre-Calculus

College Algebra 🗐

Calculus >>



English

English Sequence **Transitional English**

English Composition >>

Technical Math

College Algebra / Trigonometry

Calculus 🖺



Sequence



English Composition

Oral Communication



AP or **Dual Credit**



Dual Credit Credit Course Affiliated With IAI Code Course



Course or Program Prepares for Industry Credential



Postsecondary College and Career Course Affiliated Pathway Endorsement with IAI Code Earned



If courses in this column were accomplished through early college credit, students should take the next required course in the sequence or, if none, additional AAS or Major Courses

Strategic Dual Credit Course Competencies

ORIENTATION

Introduction to Technology & Engineering

Goal: Students build pathway awareness, excitement, and foundational knowledge.

Competencies:

- Students can demonstrate awareness of the career pathways in advanced manufacturing and engineering in order to plan a personalized pathway leading to a promising credential.
- Students can demonstrate awareness of and have exposure to the range of manufacturing processes including fabrication, machining, nondurable good production, additive manufacturing, and robotic automation in order to contextualize their instruction in the field.
- Students can use their understanding of safety practices and PPE in order to demonstrate a safety mindset when navigating a manufacturing environment.

- Students can use their understanding of simple hand and power tools in order to identify, correctly set-up, and safely operate them.
- Students can use their understanding of simple machines to describe how levers, gears, pulleys, and other simple machine components work.
- Students can use their understanding of basic concepts in layout, print reading, measurement, and quality practices in order to describe the steps in the design and development process.

Students have engaged in career exploration activities that include virtual and in-person site visits to engineering firms, manufacturers of both durable and non-durable goods, and engagement with guest speakers.

Students have documented a personalized career pathway leading to a promising credential in Advanced Manufacturing or Engineering.



SKILL DEVELOPMENT

Foundations of Production & Manufacturing Processes (Minimum 3–6 Dual Credit Hours)

Goal: Students engage in teacher-directed machining applications.

Competencies (scaffolding upon Orientation competencies):

- Students can use their understanding of safety principles in equipment usage, practices, and procedures in order to maintain a secure work environment and safely engage in manufacturing processes.
- Students can use their understanding of personal safety and environmental regulations to comply with local, federal, and company health and safety demands.
- Students can use their understanding of basic machining or other automated production methods to conduct authentic projects under close adult direction and supervision.
- Students can apply basic concepts in layout, print reading, measurement, and quality assurance practices in authentic situations.

 Students can apply their understanding of supply chain logistics in an authentic situation involving the movement and storage of materials and products.

Students have engaged in:

- Additional virtual and in-person site visits to manufacturing and engineering employers;
- A job shadow with a professional in the field
- At least one team-based challenge, such as robotics team or SkillsUSA competition.

Students are prepared to attain:

- OSHA 10-hour course completion card and
- MSSC Safety + Quality Practices & Measur or
- NIMS ML I: Measurement, Materials, and S Job Planning, Benchwork & Layout

CAPSTONE

Advanced Production & Manufacturing Processes (Minimum 3-6 Dual Credit Hours)

Goal: Students are self-directed in production applications.

Competencies (scaffolding upon Skill Development competencies):

- Students can use their understanding of production applications and production process to, with minimal supervision, plan, calculate, and safely (i) machine a part meeting customer requirements (for courses aligned to NIMS) or (ii) make a product within a production system (for courses aligned to MSSC) meeting customer requirements.
 - This competency addresses the following sub-competencies included within the PWR Advanced Manufacturing and Engineering Technical Competencies: Equipment Safety; Manufacturing Environment; Personal Health & Safety; Spatial Reasoning; Process, Design, & Development; Installation; and Customer Focus.
- Students can apply their understanding of supply chain logistics in authentic scenarios involving materials for the part or product and its distribution to the customer.

- Students can apply their understanding of digital manufacturing tools and robotic automation in an authentic situation involving their application within production applications.
- Students can apply their understanding of quality control practices and continuous improvement in an authentic situation involving quality system requirements as defined by customer specifications.
- Students can use their understanding of maintenance principles and requirements to recognize potential maintenance issues and perform preventative maintenance and routine repairs.

Students have engaged in:

- At least one additional team-based challenge, and
- A career development experience of a minimum of 60 hours with a manufacturer or engineering employer sponsor.

Students are prepared to attain:

- MSSC Certified Production Technician or
- NIMS Level I CNC Turning (Lathe) Operations + Mill Operations

Model Programs of Study in Action

Rock Valley College



Rock Valley College



Denise Anderson
Chair, Engineering & Technology
d.anderson@rockvalleycollege.edu

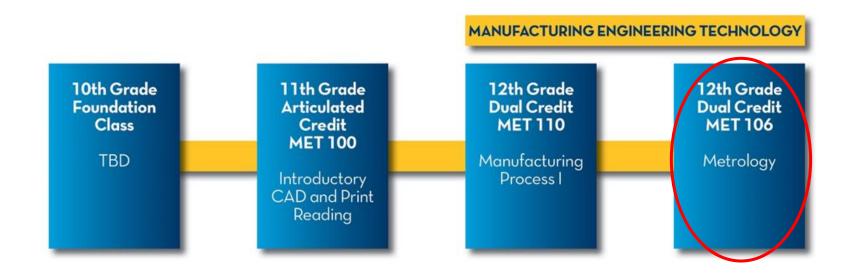


Cara Schultz
Dean, Early College
c.schultz@rockvalleycollege.edu



RVC REGIONAL PATHWAY

Advanced Manufacturing Pathway Starting Fall 2019

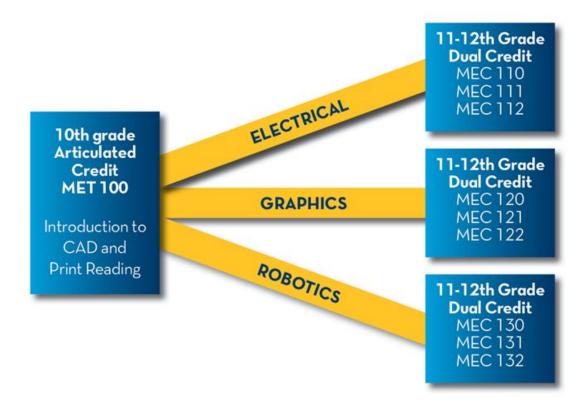


R@ckValleyCollege



RVC REGIONAL PATHWAY

Mechatronics Starting Fall 2020



R@ckValleyCollege



WHERE WE ARE

- PLTW articulated agreements EGR 101 Intro to Engineering (since 2019)
- Districts exploring MET 110 Manufacturing Processes I for school year 2022-2023
 - Implemented at an alternative high school campus since 2019
- Partnering with EFE on dual credit boot camps and dual credit instructor professional development (Solidworks and industry drafting standards)
- Expanding interest to other districts
- New Bridge Coordinator position



CHALLENGES

- Equipment costs
- Originally identified pathways courses were not practical for implementation
- Tracking articulated course rosters
- Lack of familiarity and use of SolidWorks and industry drafting standards within the high schools
- Fast paced industry changes; MATLAB
- Planning & implementation of program updates
- Post-secondary to secondary faculty connection
- Manufacturing advisory committee fell dormant

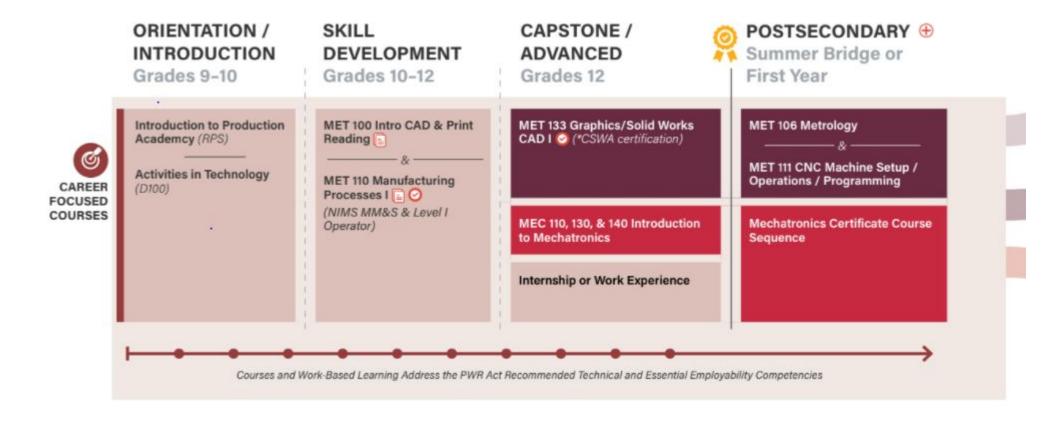


SUCCESSES

- Commitment to re-establish advisory committees in partnership with EFE
 - BILT model advisory
 - Same industry partners
 - Connection point for secondary & postsecondary faculty
- Partnership with Early College and academic department in adjusting recommended POS for dual credit
- Summer dual credit instructor boot camps developed in collaboration with EFE, Early College, and academic department for professional development and continuous program improvement
- School districts working towards allocating funds to equipment purchases
- Summer Manufacturing & Engineering bridge programs reimplemented summer 2021



MET Dual Credit/Dual Enrollment Options





What's Next?

- Launching master course templates in Canvas LMS with Center for Instructional Design, Teaching & Innovation (CITI)
 - Professional Learning Community for secondary dual credit instructors
 - Additional connection point for secondary & postsecondary faculty
 - Access to college curriculum and shared resources
- Full implementation of manufacturing, engineering, and mechatronics pathways
- Exploring integration of transitional STEM math into the pathway
- Partnering on work based learning initiatives
- Focus on assessments and design to drive curriculum plans
- Emphasis on continuing summer bridge programs
- Connecting with peer institutions



Something still circling in my mind is...

Something that squares with my thinking is...

3
Takeaways
I have are...

Share Your Feedback

Survey QR Code



https://niu.az1.qualtrics.com/jfe/form/SV_4VhZXbPLe740vC6



Survey Questions

1

Model Programs of Study

Assess the implementation of the Model Programs of Study.

2

Advisory Committee

Assess the effectiveness of the committee or join an upcoming committee.

3

Webinar Review

Assess the effectiveness of the Webinar session.



Next Steps: Upcoming Statewide Model Programs of Study Webinars

Information Technology

January 11, 2022 | 2-3:30 p.m.

Agriculture, Food, and Natural Resources

January 25, 2022 | 2-3:30 p.m.

Architecture, Construction, and Energy

February 22, 2022 | 2–3:30 p.m.

Finance and Business Services

March 15, 2022 | 2-3:30 p.m.

Arts and Communications

April 19, 2022 | 2-3:30 p.m.



Next Steps: Potential Statewide Model POS Guides Creation

Select from the following:



(Non-Education)



Culinary and Hospitality









Engage in conversations on creating sustainable, high-quality models that provide broader and more equitable access, focusing on building social capital for Black and Latinx students

Explore the Resource Hub and sign up for the newsletter





Identify needs for state policy changes or support systems



Thank You

Survey: https://niu.az1.qualtrics.com/jfe/form/SV 4VhZXbPLe740vC6

Guides: edsystemsniu.org/guides