ENERGY EDUCATION RESOURCE GUIDE

https://www.cleanenergyexcellence.org/

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Pacific Northwest Center of Excellence for Clean Energy

We are a regional resource connecting the energy industry, innovative technologies, and labor partners with Washington's Community and Technical Colleges.

Pacific Northwest Center of Excellence for Clean Energy

Our goal is simple: ensure employers have the skilled professionals they need and students gain the training to succeed in a rapidly evolving industry.

From the CoE

The energy industry is undergoing a profound transformation. Rising electricity demand, aging infrastructure, and the transition to a cleaner system are creating both challenges and opportunities. At the same time, workforce attrition due to retirements and rapid growth in renewable technologies are driving an urgent need for skilled professionals.

Washington stands out as a hub for innovation, offering diverse career paths for those eager to make an impact. From engineers and electricians to HR specialists and accountants, utilities need talent across the board. The state also hosts the nation's largest concentration of independent fusion companies—pioneering efforts to bring the power of the sun to Earth.

Whether you're an innovator, a machinist, or an engineer there's a place for you in shaping the future of energy.

Advisory Board

Our advisory board is comprised of partners and representatives from industry (including consumer and investor-owned utilities), community and technical colleges, universities, and organized labor. The Board provides advice and insight from different perspectives to help the Center achieve its mission and advance the needs of the energy sector in the Pacific Northwest.

- Avista
- Bonneville Power Administration
- Center for Advanced Transportation & Energy Solutions
- Centralia City Light
- Centralia College
- Economic Alliance of Lewis County
- Energy Northwest
- IBEW 77
- Lewis County PUD
- Pacific Northwest Hydrogen Association (PNWH2)
- Portland General Electric
- Puget Sound Energy
- Tacoma Public Utilities
- Wahkiakum PUD
- Washington State University

WASHINGTON STATE CENTERS of EXCELLENCE

Bridging the gap between industry, education, labor, and leadership in Washington State.

There are 12 Centers of Excellence throughout the state serving as economic development drivers for industry and education. Each Center focuses on a targeted industry and works closely with the state's community and technical colleges, industry partners, and stakeholders from areas such as government, labor, workforce development and others. The Centers maximize resources by bringing together workforce education and industry partners in order to develop highly-skilled employees throughout the state.

Centers of Excellence

Aerospace & Advanced Manufacturing
Everett Community College, Everett
https://www.coeaerospace.com

Agriculture & Natural Resources
Walla Walla Community College, Walla Walla
https://agcenterofexcellence.com/

Allied Health
Yakima Valley Community College, Yakima
https://my.yvcc.edu/coe

Clean Energy
Centralia College, Centralia
https://www.cleanenergyexcellence.org/

Construction
Renton Technical College, Renton
https://constructioncenterofexcellence.com/

Cybersecurity
Whatcom Community College, Bellingham
https://coecyber.io/

Education
Green River College, Auburn
https://www.careersined.org/

Global Trade & Supply Chain Management
Highline College, Des Moines
https://coeglobaltrade.com/

Homeland Security-Emergency Management
Pierce College, Lakewood
https://www.coehsem.com/

Information and Computing Technology
Bellevue College, Bellevue
https://coeforict.org

Marine Manufacturing & Technology
Skagit Valley College, Mount Vernon
https://www.washingtonmaritimecareers.org/

Semiconductors & Electronic Manufacturing
Clark College, Vancouver
https://semewa.com/

Centralia College

Centralia College, host of the CoE, was founded in 1925- making it the oldest continuously operating two-year college in Washington. Serving both Lewis and south Thurston counties, CC has a rich heritage of transfer, workforce, and basic skills programs.

Check out CC's website!

The **Industrial Trades** certification is a one-year program that trains students in foundational classes to enter the workforce or continue to a second-year program:

- **Electronics, Robotics, & Automation**
  - Trains students in electrical systems, robotics, and sensors.
- **Diesel Technology**
  - Technical knowledge and hands-on skills to enter a variety of industries.

More Resources

Pacific Northwest Center of Excellence for Clean Energy

The Center has multiple pages of resources available to students including:

- Registered apprenticeship programs
- Detailed career pathway maps & information
- College programs directory
- Internship opportunities
- Scholarship information
- List of employers in the Pacific Northwest
- Advanced CTE Career Clusters

See our website to learn more!

Why Get Into Energy

More than 8 million people work in energy careers across the nation.

The energy industry offers work that is essential, rewarding, and always in demand. Employees are often paid more than the national average because of the knowledge and skill required. These professionals are proudly leading the country's climate change goals while maintaining energy reliability, resiliency, safety, and affordability.

Although most electricity is generated in much the same way it was in the late 1800's, from power plants that use a turbine to drive electricity generators, there have been advancements in areas outside of our #1 hydropower generating resource.

Emerging Technologies

Rapid advancements in the energy industry are leading to new opportunities and careers in different areas of the energy industry.

Some of these technologies include:

- **Waste-to-Energy:** converting non-recyclable waste into electricity and heat, reducing landfill usage, lowering greenhouse gas emissions and supporting cleaner energy initiatives.
- **Battery Technology Centers:** revolutionizing energy storage and use, playing a critical role in renewable energy integration and electric vehicles.
- **Geothermal Energy:** harnessing heat from the Earth's core to generate electricity and provide direct heating providing consistent, baseload power.
- **Hydrogen Energy:** with applications in fuel cells, industrial processes and energy storage. Hydrogen offers a versatile solution to decarbonize transportation, manufacturing and the power grid.
- **Electrification of Transportation:** the shift toward electric vehicles (EVs) and other electrified transportation systems is reshaping industries and the need for skilled professionals who can design, build, maintain and innovate in the EV space is quickly rising.
- **Fusion Energy:** transitioning from science to market, Washington is home to the largest cluster of fusion companies that need technicians, machinists, and engineers to unlock the transformative potential of fusion energy.

Examples of Energy Careers

Entry Level (with on-the-job training)

Customer Service Representative
Facilities Maintenance Technician
Ground Crew
Solar Photovoltaic Technician
Renewable Energy Technician
Weatherization Technician

Apprenticeship

Electrician
HVAC Technician
Hydroelectric Mechanic
Lineman/Lineworker
Substation Electrician
System Operator

Masters and/or Doctorate Degree

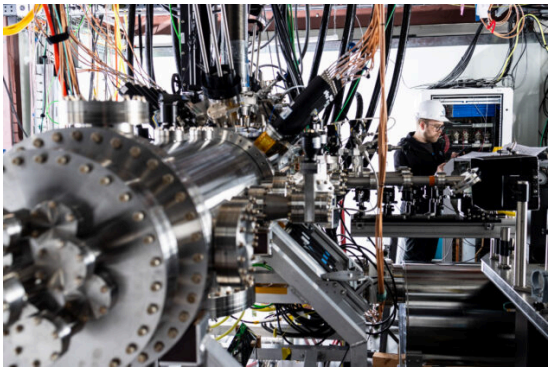
Electrical Engineer
Energy Engineer
Energy Trader
Founder, Energy Related Enterprise
Fuel Cell Engineer
Nuclear Engineer

Certification or Associates

Commercial Diver
Cybersecurity/IT
Energy Auditor
HVAC Technician
Nuclear Technician
Power Plant Operator

Bachelors Degree

Electrical Engineer
Energy Engineer
Energy Policy Analyst
Hydroelectric Production Manager
Nuclear Engineer
Sustainability Specialist



Areas of Study

There are a wide variety of careers within the energy industry- from linemen to engineers, technicians to cybersecurity specialists, and many more. With entry points at all levels of ability and education there is a place for anyone interested in the energy industry.

The CoE provides detailed information about pathways into the energy industry, including a comprehensive list of college programs.

Organized into 9 areas of study, you can explore transferable skills and career pathways:

- Apprenticeship
- Electrical
- Energy Efficiency/Studies
- Engineering (advanced, technician, & transfer)
- EV/Automotive
- Industrial
- Mechatronics
- Nuclear
- Trades (listed with Industrial in this guide)

Some of the abbreviations you might find in this guide include:

- **Cert**: Certification
- **AAS**: Associate in Applied Science
- **AAT**: Associate of Applied Technology
- **AAS-T**: Associate in Applied Science-Transfer
- **AST2 or AST-2**: Associate in Science-Transfer Track 2
- **BAS**: Bachelor of Applied Science

*Cybersecurity also holds a highly critical role within the clean energy industry. To learn more about this area of study, visit https://coecyber.io/.

Visit the address above or scan the QR code to learn more!

Apprenticeship

There are a wide variety of careers available through apprenticeship and many benefits, such as getting paid to learn on the job and union membership. Once completed, an apprentice becomes a nationally recognized journeyman.

Several colleges have agreements and work with Joint Apprenticeship and Training Committees (JATCs) and other organizations that sponsor apprenticeships, enabling students to get a degree alongside their journey-level credential.

Bates Technical College
- 7 programs; including HVAC and Industrial Maintenance

Columbia Basin College
- 7 programs; including Electrician and Lineman

Everett Community College
- 8 programs; including Lineman and Utility Wireman

North Seattle CC
- Associate Controls Specialist

Olympic College
- Industrial Trades Technician/Helper; ATA

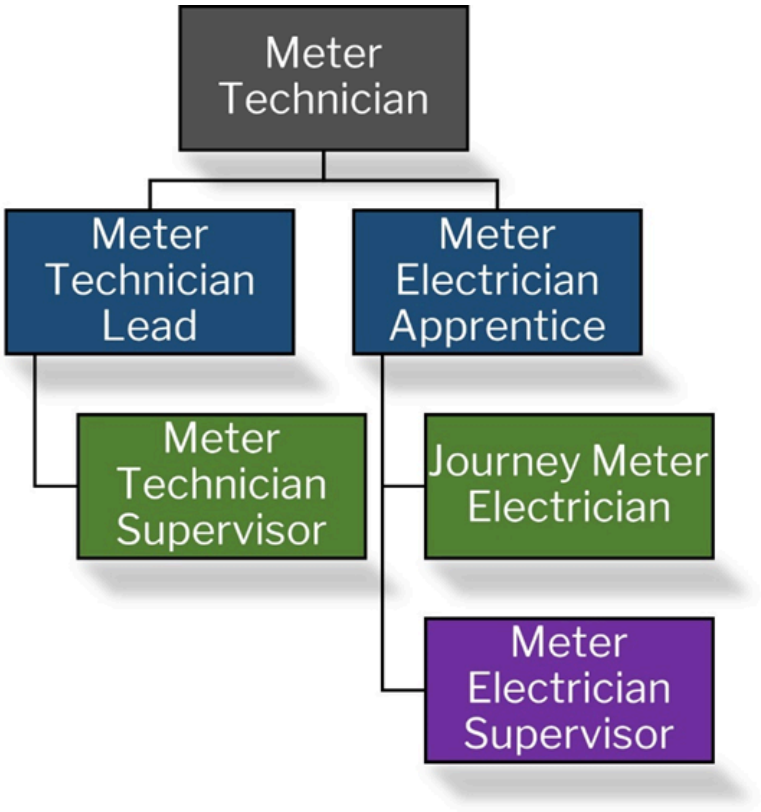
Renton Technical College
- Stationary Engineer
- Multi-Occupational Trades; AAS

Skagit Valley College
- Multi-Occupational Trades; AAS

South Seattle College
- 13 programs; including Multi-Occupational Trades AAS

Spokane Community College
- 19 programs; including Multi-Occupational Trades AAS

Wenatchee Valley College
- Multi-Occupational Trades; ATS

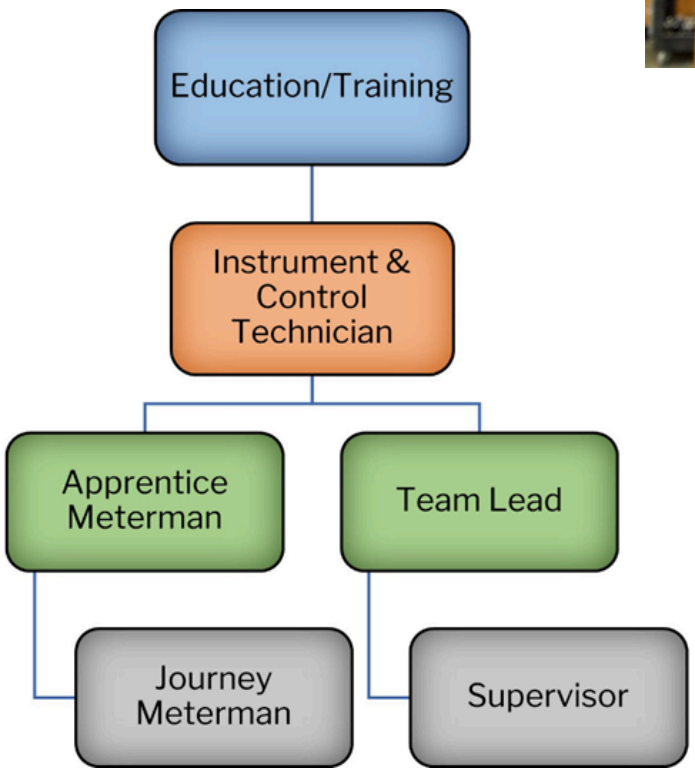


*Some apprenticeships require additional certifications, such as:
- First Aid/CPR and AED
- OSHA Safety Training
- Commercial Driver License (CDL)
- Flagger Certificate

Visit the Apprenticeships webpage to learn more:
https://www.cleanenergyexcellence.org/apprenticeships/

Electrical

The electrical area of study encompasses careers such as electrician, instrumentation & control technician, electrical maintenance, and electrical construction. These careers have a variety of advancement opportunities and can work in a variety of industries.



Transferrable skills include:

- Critical thinking & problem solving
- Practical application of electrical and engineering science
- Design techniques, tools, and principles of technical plans
- Ability to modify and repair electronic equipment
- Read/create blueprints, wiring diagrams, and engineering instructions

Work activities may include:

- Work alongside and under the supervision of engineers
- Design, build, repair, or modify electrical components, controls, and machinery
- Set up and testing of systems
- Evaluate performance of parts or assemblies
- Work in a variety of locations/environments such as homes, businesses, and power generation plants

Colleges and Degrees

Bates Technical College
- Electrical Construction; AAS, Cert.

Bellingham Technical College
- Electrical Construction; Cert.
- Electrician; AAS, AAS-T

Centralia College
- Electronics, Robotics, & Automation (ERA); AAS

Clover Park Technical College
- Electrician Low Voltage Fire/Security; AAT, Cert.

North Seattle College
- Electronics Technology; AAS, Cert.
- IT Controlled Electronic Systems; AAS, Cert.

Perry Technical Institute
- Electrical Technology; Cert.
- Instrumentation, Automation & Robotics Technology; Cert.

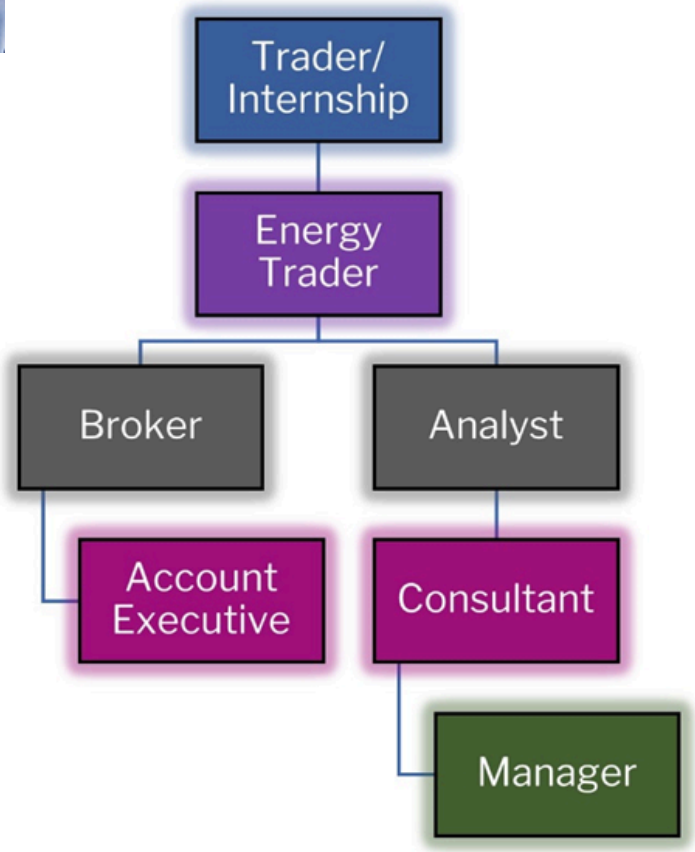
Spokane Community College
- Electrical Maintenance & Automation; AAS
- Electrical Trainee/Electrical Sales; Cert.
- Power Systems Maintenance; AAS

Walla Walla Community College
- Cellar Master; Cert.
- Electrical Systems Technology, Cert.

Cowlitz Falls Dam, Lewis County PUD

Energy Efficiency/Studies

Energy efficiency/studies is a broad area of study that covers all things energy specific such as energy systems technology and energy policy. Examples of careers in this field are energy auditor, energy policy analyst, and sustainability specialist. With experience or additional education, you can even move on to energy program management or energy trading.



Transferrable skills include:

- Analytical or scientific software use
- Efficient communication & explanation skills
- Ability to analyze data and make calculations
- Knowledge of machines and tools, including their designs, uses, repair, and maintenance
- Troubleshooting and decision making

Work activities may include:

- Support and implementation of programs that improve environment/green building practices
- Perform inspections or test machinery to diagnose malfunctions
- Buy or sell shares of energy or energy commodities in power markets
- Manage, develop, and propose energy policy and/or regulations
- Inspect homes/buildings and make recommendations to reduce energy waste

Colleges and Degrees

Cascadia Community College
- Sustainable Practices; BAS

Clover Park Technical College
- Construction Technology- LEED Energy Auditor; AAT

Shoreline Community College
- Clean Energy Technology & Entrepreneurship; AAAS, Cert.

South Seattle College
- Sustainable Building Science Technology; BAS

Walla Walla Community College
- Energy Systems Technology (multiple concentration options); AAS
- Renewable Energy; AAS, Cert.

There are also a few university level programs with energy efficiency/studies programs:

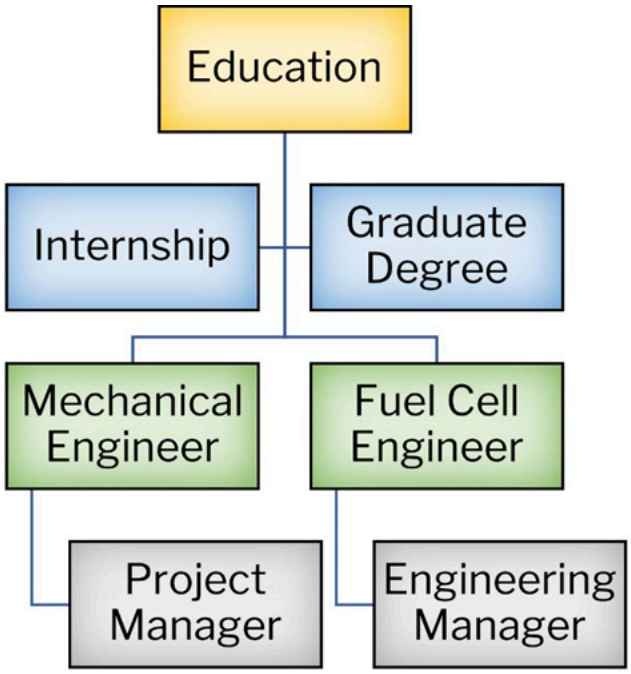
Gonzaga University
- Electrical Engineering- Power and Green Energy Systems Specialty; BAS

Western Washington University
- Business & Sustainability- Energy Studies; BA
- Energy and Environment; Cert.
- Energy Economics; Cert.
- Energy in the Built Environment; Cert.
- Energy Policy and Management; BA
- Energy Policy; Minor, Cert.
- Energy Science; Minor
- Energy Science and Technology; BS
- Energy Science and Technology, Net Zero Energy Design Track; BS
- Northwest Electric Energy Systems; Cert.

Rocky Reach Dam, Chelan County PUD

Engineering

Engineering encompasses all specialties such as chemical, civil, computer, electrical/electronics, energy, engineering technology, industrial, mechanical, mechatronics, and nuclear. Many are specialized and are not offered widely; however, nearly all of Washington's community and technical colleges offer transfer degrees and many offer engineering technician certificates and degrees for more hands-on work.



Transferrable skills include:

- Critical thinking and problem solving
- Knowledge of practical application of engineering science
- Strong mathematics and reading comprehension
- Familiar with technology (computer aided design, analytical software, Microsoft Office)
- Preparation of technical drawings and specifications

Work activities may include:

- Design and development of energy-related projects and programs
- Building prototypes, testing, and adjusting products
- Testing and implementing the elements of power generation
- Research and design of systems including electric generators and batteries

Colleges and Degrees

Community & Technical Colleges (CTCs), Engineering Transfer:

- Bellevue College
- Big Bend Community College
- Cascadia College
- Centralia College
- Clark College
- Columbia Basin College
- Edmonds Community College
- Everett Community College
- Grays Harbor College
- Green River College
- Highline College
- Lake WA Institute of Technology
- Lower Columbia College
- North Seattle College
- Olympic College
- Pierce College
- Seattle Central College
- Shoreline Community College
- Skagit Valley College
- South Puget Sound Community College
- South Seattle College
- Tacoma Community College
- Walla Walla Community College
- Whatcom Community College
- Yakima Valley College

Community & Technical Colleges (CTCs), Engineering Technician:

- Bates Technical College
- Lake WA Institute of Technology
- North Seattle College
- Olympic College
- Renton Technical College
- South Seattle College
- Spokane Community College
- Walla Walla Community College
- Wenatchee Valley College
- Yakima Valley College

Advanced Engineering Degrees (BS, MS, Ph.D.) at CTCs and Universities:

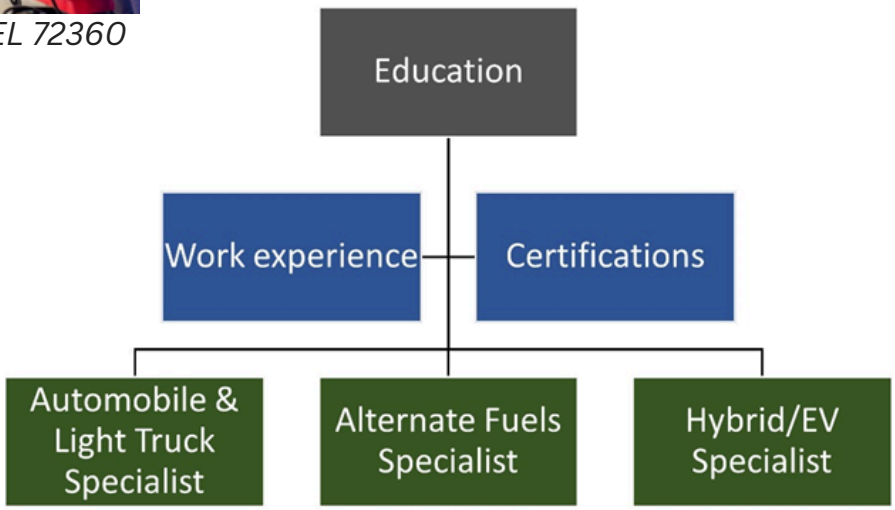
- Central Washington University
- Eastern Washington University
- Gonzaga University
- Olympic College (w/WSU)
- Saint Martin's University
- Seattle Pacific University
- Seattle University
- University of Washinton
- Walla Walla University
- Washington State University
- Western Washington University
- Whitworth University

Boundary Dam, Seattle City Light

EV/Automotive

Photo by Werner Slocum, NREL 72360

Compared to the other areas of study, EV/Automotive is very narrow- including only automotive technology programs that cover hybrid and electric vehicles. Some of these are specialized programs while some are more general. Students in these programs go on to become mechanics and work in a variety of shops such as dealerships, fleet businesses, and federal or local government repair shops.



Transferrable skills include:

- Critical thinking and trouble shooting skills
- Communication with customers and supervisors
- Proper use and maintenance of power and hand tools
- Ability to use computerized diagnostic equipment

Photo by Werner Slocum, NREL 72386

Work activities may include:

- Inspect vehicles for damage and record findings so that necessary repairs can be made
- Test drive vehicles, components, and systems
- Review work orders and discuss work with supervisors
- Perform repair and maintenance on vehicles

Colleges and Degrees

Bellingham Technical College
- Automotive Technology; AAS, AAS-T

Clark College
- HiTECC Automotive Technology; AAT
- Toyota T-TEN Automotive Technology; AAT

Clover Park Technical College
- Hybrid & Alternative Fuel Vehicle Technician; AAT, AAS-T, Cert.

Columbia Basin College
- Automotive Technology; AAS

Grays Harbor College
- Automotive Technology; AT

Peninsula College
- Automotive Technology; Cert.

Shoreline Community College
- Automotive Service Technician (with Tesla Cert.); AAAS, Cert.
- Electric Vehicle Technician (Tesla); Cert.
- Toyota Technician Training and Education (T-TEN); AAAS, Cert.

Skagit Valley College
- Automotive Technology; AAS, AAS-T

South Puget Sound Community College
- Automotive Technology; AAS

Spokane Community College
- Automotive: Toyota T-TEN; AAS

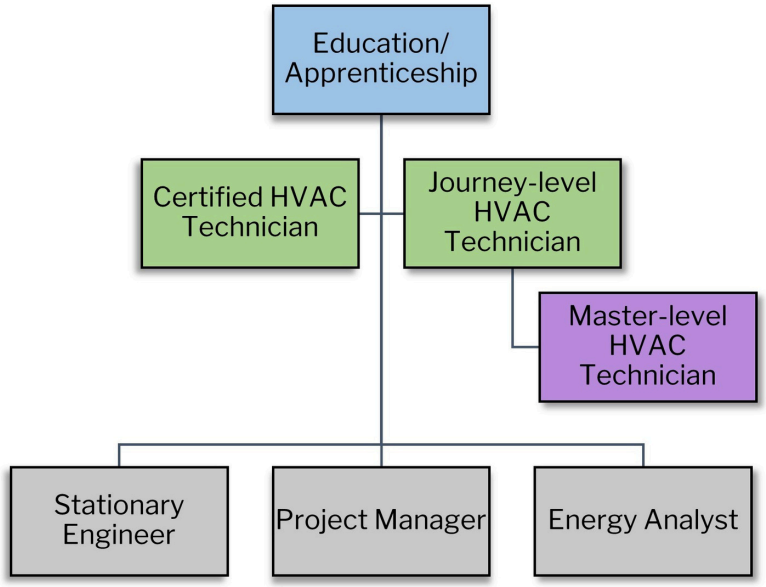
***South Seattle College** will open an EV program in 2027.

Note: Some colleges offer EV training for manufacturers, such as Rivian at Renton Technical College.

Photo by Joe DelNero, NREL 74840

Industrial & Trades

These two areas of study cover a wide variety of careers such as HVAC technicians, building care and maintenance technicians/engineers, millwrights, and industrial power and controls. These careers can lead to positions within many industries including water treatment, manufacturing, and most importantly- power generation.



Transferrable skills include:

- Knowledge of machines and tools, including their uses, repair, and maintenance
- Troubleshooting and decision making
- Knowledge of building construction materials, methods, and tools
- Technology skills- email, industrial control software, facilities management software, Microsoft Office

Work activities may include:

- Test faulty equipment to diagnose malfunctions
- Repair or replace faulty equipment, machines, and structures
- Perform routine maintenance of tools and equipment
- Study blueprints, design specifications, and manufacturers recommendations to ensure proper installation of equipment

Photo by Dennis Schroeder, NREL 54321

Colleges and Degrees

Industrial:

Bellingham Technical College
- Instrumentation and Control Technology; AAS, AAS-T

Big Bend Community College
- Manufacturing and Process Technology; AAS-T

Centralia College
- Industrial Trades; Cert.

North Seattle College
- Industrial Power and Control; AAS, Cert.
- Industrial Automation and Electronic Controls; Cert.

Wenatchee Valley College
- Industrial Technology-Electronics; ATS, Cert.

Trades:

Bates Technical College
- Building Care & Maintenance; Cert.
- Facilities Maintenance Engineer; AAS
- HVAC; AAS, Cert.

Bellingham Technical College
- HVAC & Refrigeration; AAS, AAS-T

Clover Park Technical College
- HVAC; AAT, Cert.
- Lineman & Arboriculture; AAT, Cert.

Lower Columbia College
- Multicraft Trades; Cert.

Perry Technical Institute
- HVAC/R; Cert.

Spokane Community College
- HVAC/R; AAS

Wenatchee Valley College
- Environmental Systems & Refrigeration Technology; ATS

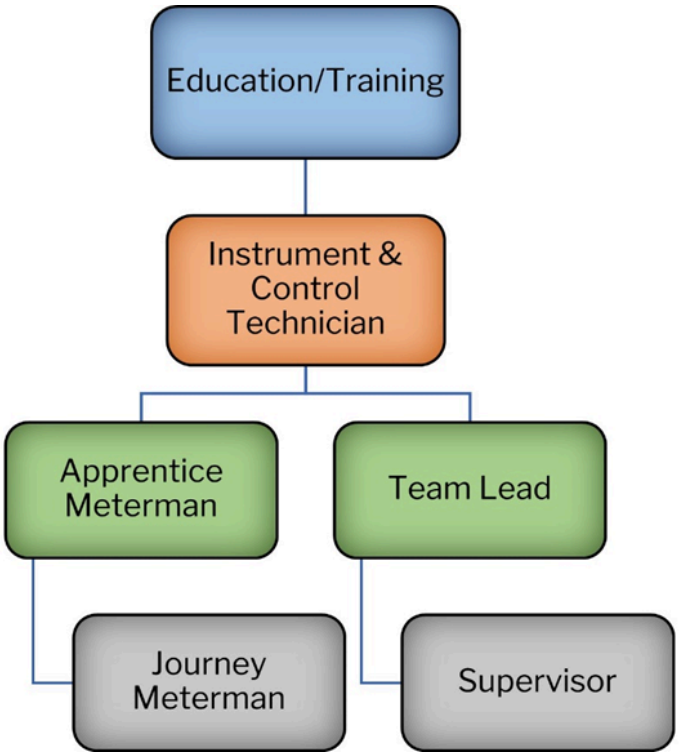
Mossyrock Dam, Tacoma Public Utilities

Mechatronics

Mechatronics, which may also be referred to as Smart Manufacturing, is an interdisciplinary field that combines mechanical engineering, electronics, computer science, and robotics. It can be applied in various industries in technical careers in automation, electrical/electronics, industrial engineering, manufacturing, programmable logic controllers, and instrument and control technician.

Transferrable skills include:

- Knowledge of analytical, scientific, and industrial control software
- Ability to modify computer-controlled robot movements and maintain service records
- Trouble shooting and decision-making skills
- Reading blueprints, schematics, and diagrams



Work activities may include:

- Make repairs to robots or peripheral equipment, such as replacement of defective circuit boards, sensors, and controllers
- Install, program, or repair programmable controllers, robot controllers, or conveyors
- Maintain or repair electronics equipment or systems
- Operate specialized or standard test equipment to diagnose or test electronic components or systems

Colleges and Degrees

Bates Technical College
- Automation and Mechatronics; AAS

Bellingham Technical College
- Industrial Maintenance & Mechatronics; AAS

Clark College
- Mechatronics- Mechanical and Instrumentation Automation; AAT, Cert.

Clover Park Technical College
- Mechatronics Engineering Technology and Automation; BAS, AAS-T, AAT, Cert.

Edmonds Community College
- Mechatronics & Automation Technology; ATA

Everett Community College
- Advanced Manufacturing Technology- Mechatronics; ATA

Green River College
- Mechatronics Technician/Maintenance Mechatronics; AAS, Cert.

North Seattle College
- Mechatronics; AAS

Renton Technical College
- Mechatronics; AAS, Cert.

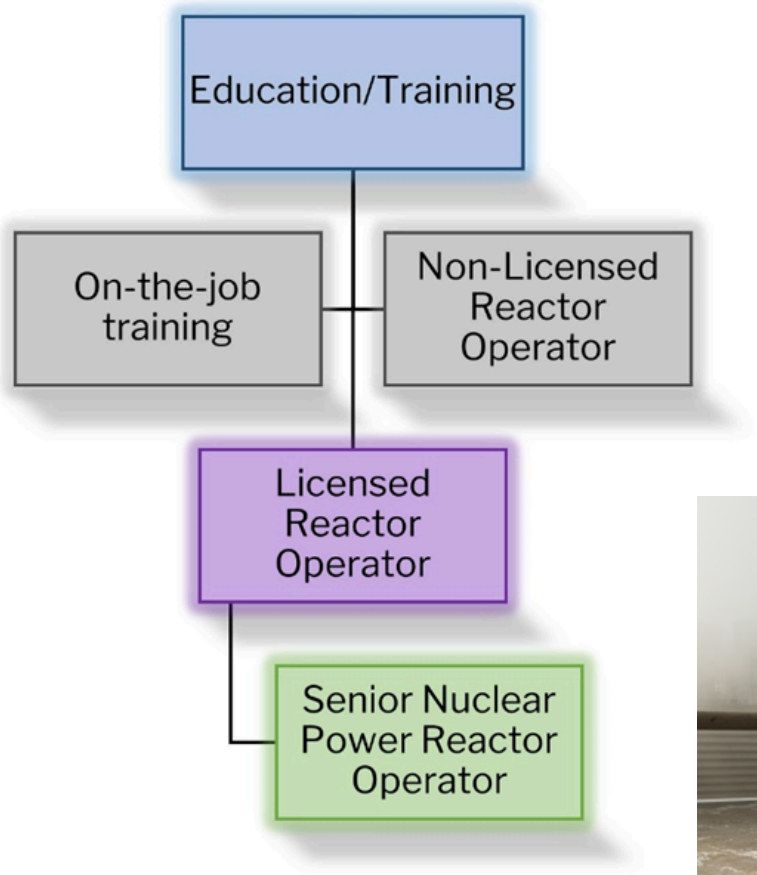
Shoreline Community College
- Mechatronics (collaboration w/North Seattle); AAAS, Cert.

Spokane Community College
- Robotics and Mechatronics Technology; AAS

Bonneville Dam, Bonneville Power Administration

Nuclear Technology

Nuclear technology is the most specific area of study and can lead to careers such as nuclear power operator, nuclear technician, and nuclear engineer. Columbia Generating Station is the northwest's only commercial nuclear energy facility and Columbia Basin College is the only community and technical college with programs in nuclear technology.



Transferrable skills include:

- Knowledge of mathematics and proper applications
- Ability to follow detailed instructions
- Strong communication with supervisors, peers, and other employees
- Practical application of engineering science and technology

Work activities may include:

- Test faulty equipment to diagnose malfunctions
- Repair or replace faulty equipment, machines, and structures
- Perform routine maintenance of tools and equipment
- Study blueprints, design specifications, and manufacturers recommendations to ensure proper installation of equipment

Colleges and Degrees

Columbia Basin College

- Nuclear Technology Instrumentation & Control Technician; AAS
- Nuclear Technology Non-Licensed Nuclear Operator; AAS
- Nuclear Technology Radiation Protection Technician; AAS

Washington State University

- Nuclear Materials; Grad. Cert.

University of Washington

- Host of the National Institute for Nuclear Theory (INT)

Columbia Generating Station, Energy Northwest

Index of Colleges

Washington State's Community and Technical Colleges are listed here with the areas of study found in this guide.

For more detailed information, visit the State Board for Community and Technical Colleges.

1) Bates Technical College
Apprenticeship
Electrical
Engineering Technician
Mechatronics
Trades

2) Bellevue College
Engineering Transfer

3) Bellingham Technical College
Electrical
EV/Automotive
Industrial & Trades
Mechatronics

4) Big Bend Community College
Engineering Transfer
Industrial

5) Cascadia College
Energy Efficiency/Studies
Engineering Transfer

6) Centralia College
Electrical
Engineering Transfer
Industrial

7) Clark College
Engineering Transfer
EV/Automotive
Mechatronics

8) Clover Park Technical College
Electrical
Energy Efficiency/Studies
EV/Automotive
Mechatronics
Trades

9) Columbia Basin College
Apprenticeship
Engineering Transfer
EV/Automotive
Nuclear Technology

10) Edmonds College
Engineering Transfer
Mechatronics

11) Everett Community College
Apprenticeship
Engineering Transfer
Mechatronics

12) Grays Harbor College
Engineering Transfer
EV/Automotive

13) Green River College
Engineering Transfer
Mechatronics

14) Highline College
Engineering Transfer

15) Lake Washington Institute of Technology
Engineering Technician & Transfer

16) Lower Columbia College
Engineering Transfer
17) North Seattle College
Apprenticeship
Electrical
Engineering Technician & Transfer
Industrial
Mechatronics
18) Olympic College
Apprenticeship
Engineering Technician & Transfer
Engineering Advanced (with WSU)
19) Peninsula College
EV/Automotive
20)Pierce College Fort Steilacoom
Engineering Transfer
21) Pierce College Puyallup
Engineering Transfer
22) Renton Technical College
Apprenticeship
Engineering Technician
Mechatronics
23) Seattle Central College
Engineering Transfer
24) Shoreline Community College
Energy Efficiency/Energy Studies
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EV/Automotive
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25) Skagit Valley College
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26) South Puget Sound Community College
Engineering Transfer
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27) South Seattle College
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30) Tacoma Community College
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Engineering Technician & Transfer
32) Wenatchee Valley College
Apprenticeship
Engineering Technician
Industrial
Trades
33) Whatcom Community College
Engineering Transfer
34) Yakima Valley College
Engineering Technician & Transfer

Other colleges & universities mentioned in this guide:

- Central Washington University, Ellensburg
- Eastern Washington University, Cheney
- Gonzaga University, Spokane
- Perry Technical Institute, Yakima
- Saint Martin's University, Lacey
- Seattle Pacific University, Seattle
- Seattle University, Seattle
- University of Washington, Seattle
- Walla Walla University, College Place
- Washington State University, Pullman
- Western Washinton University, Bellingham
- Whitworth University, Spokane

Pacific Northwest
Center of Excellence for
Clean Energy