From spring of 2012 through spring of 2013, graduates from the Manufacturing Division’s Precision Machining Technology program had an average of more than 7 job opportunities per graduate.

Manufacturing Division
Manufacturers are becoming increasingly more dependent upon the use of high-tech equipment that involves multiple, integrated systems. It is critical that these companies are able to recruit and employ individuals who know how to operate, troubleshoot and maintain this high-tech equipment.

Ranken’s Advanced Manufacturing Technology program is designed to prepare students for employment with companies that have implemented a team-oriented design, production, quality and maintenance environment. Advanced Manufacturing Technology is a four-semester program that leads to an associate degree or certificate. Each semester consists of instruction in a classroom setting as well as training in a live production facility.

Associate of Technology Certificate of Technology Associate of Science

COURSE DESCRIPTIONS

MFG1000 CNC Operations
This course begins with detailed coverage of machine shop safety. Subsequently, students will develop the necessary entry-level skills to safely and accurately operate manual lathes, manual mills, CNC mills and CNC lathes. Additional industrial equipment — such as a drill press, horizontal saw, pedestal grinder and inspection tools — will also be used. This course will focus on measurement, materials and engineering requirements with an emphasis on preparing the student for a manufacturing environment. Blueprint reading and basic right-angle trigonometry will be introduced. Seven credit hours.

MFG1005 MFG Internship I
Applying skills learned in MFG1000 to a real-world industry setting. Six credit hours.

MFG1100 Quality Practices and Inspection
In this course, students will actively participate in the quality practices and inspection activities of the machine shop. The course examines the systems used to ensure production of a quality product within a manufacturing environment. Identifying fundamentals of print reading will be covered, as well as the use of common measurement systems and precision measurement tools. The course will include theory and shop activities on Lean manufacturing, 5-S, Six Sigma and other methodologies. Instruction will also include reinforcement of prior CNC operations and advanced blueprint reading skills. Seven credit hours.

MFG1105 MFG Internship II
Applying skills learned in MFG1100 to a real-world industry setting. Six credit hours.

MFG2000 Manufacturing Processes
This course addresses the manufacturing processes used to build a product, from design to delivery into the marketplace. Students will be introduced to G-Code, MasterCAM and Mazatrol programming software. General programming methods are introduced along with tool setup, and simulations are examined. Seven credit hours.

MFG2005 MFG Internship III
Applying skills learned in MFG2000 to a real-world industry setting. Six credit hours.

MFG2010 Advanced Programming Maintenance
This course covers the mechanical skills required for technicians in a manufacturing setting. Students will learn how to monitor indicators to ensure correct operations and perform all housekeeping to maintain production schedules. Training will also cover how to recognize potential maintenance issues with production systems, including knowledge of when to inform maintenance personnel about problems with: work holding devices, machine automation systems, lubrication processes, bearings and couplings. Students will work with MasterCAM for SolidWorks to create tool path programs within SolidWorks along with further developing their skill sets in Mazatrol and MasterCAM. Seven credit hours.

MFG2015 MFG Internship IV
Applying skills learned in MFG2010 to a real-world industry setting. Six credit hours.

MFG2020 Manufacturing Processes
This course addresses the manufacturing processes used to build a product, from design to delivery into the marketplace. Students will be introduced to G-Code, MasterCAM and Mazatrol programming software. General programming methods are introduced along with tool setup, and simulations are examined. Seven credit hours.

MFG2025 MFG Internship III
Applying skills learned in MFG2020 to a real-world industry setting. Six credit hours.

MFG2030 Advanced Programming Maintenance
This course covers the mechanical skills required for technicians in a manufacturing setting. Students will learn how to monitor indicators to ensure correct operations and perform all housekeeping to maintain production schedules. Training will also cover how to recognize potential maintenance issues with production systems, including knowledge of when to inform maintenance personnel about problems with: work holding devices, machine automation systems, lubrication processes, bearings and couplings. Students will work with MasterCAM for SolidWorks to create tool path programs within SolidWorks along with further developing their skill sets in Mazatrol and MasterCAM. Seven credit hours.

MFG2035 MFG Internship IV
Applying skills learned in MFG2030 to a real-world industry setting. Six credit hours.
INDUSTRIAL TECHNOLOGY

In today’s highly complex society, technical industries and companies are being called upon to implement new technologies and equipment to improve efficiencies and maximize day-to-day operations. To minimize downtime and costly delays, companies are in need of qualified technicians capable of maintaining and repairing a wide variety of mechanical and electrical equipment. The Industrial Technology program offers comprehensive training in several of the most sought-after skills that companies are demanding as they seek employees with multi-craft skills.

Program graduates have expertise in a number of fields and are capable of stepping in and keeping equipment and machinery running in manufacturing plants, hotels or other mid-size or large companies. Recognized for their breadth of experience, they are qualified to solve most of the technical and industrial problems experienced by companies today. Additionally, our program prepares students for the Environmental Protection Agency (EPA) licensing exam covering refrigeration and air conditioning repair.

In addition to developing multiple skill sets, Industrial Technology graduates experience on-the-job diversity and increased flexibility in their career choices.

ASSOCIATE OF TECHNOLOGY ASSOCIATE OF SCIENCE OR CERTIFICATE OF TECHNOLOGY

Ranken’s Industrial Technology program provides overall instruction, hands-on training and experience in the principles and skills needed by many facilities, including universities, hospitals, hotels and industrial businesses. The Industrial Technology program offers specialized instruction in the following areas:

- Basic electricity
- Introduction to Heating, Ventilation, Air Conditioning and Refrigeration (HVACR)
- Introduction to welding
- National Electrical Code, motor controls and Programmable Logic Controllers (PLC)
- Basic pipefitting and plumbing
- Carpentry maintenance
- Hydraulics principles & theory
- Welding (TIG, MIG and SMAW)
- Industrial mechanical systems

Students interested in completing the certificate of technology program will take all technical courses in the associate degree program and two general education courses per semester.

<table>
<thead>
<tr>
<th>DAY PROGRAM COURSES</th>
<th>HOURS</th>
<th>PREREQUISITES</th>
</tr>
</thead>
<tbody>
<tr>
<td>INT1113 Industrial Mechanical Systems Theory</td>
<td>5</td>
<td></td>
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<tr>
<td>INT1114 Industrial Mechanical Systems Shop</td>
<td>8</td>
<td></td>
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<tr>
<td>INT1211 Welding/Metal Fabrication and Hydraulics Theory</td>
<td>5</td>
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<td>INT1212 Welding/Metal Fabrication and Hydraulics Shop</td>
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</tr>
<tr>
<td>INT2111 Industrial Facilities Maintenance Theory</td>
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<td>INT2112 Industrial Facilities Maintenance Shop</td>
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<td></td>
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<tr>
<td>INT2101 Industrial Electrical/PLC Theory</td>
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<td>INT2102 Industrial Electrical/PLC Shop</td>
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<tr>
<td>Total Technical Credit Hours Required</td>
<td>40</td>
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Important Note: Students can complete the semesters in any order.

<table>
<thead>
<tr>
<th>GENERAL EDUCATION COURSES (Certificate of Technology)</th>
<th>HOURS</th>
<th>PREREQUISITES</th>
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</thead>
<tbody>
<tr>
<td>ENG1101 College Composition I</td>
<td>3</td>
<td>Placement Exam</td>
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<tr>
<td>ENG1102 College Composition II</td>
<td>3</td>
<td>ENG1100</td>
</tr>
<tr>
<td>COM1105 Oral Communications</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SOC1206 Principles of Sociology or PSY1006 Introduction to Psychology</td>
<td>3</td>
<td>ENG1109 (Co. Req.)</td>
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<tr>
<td>or MTH1100 Elementary Algebra and MTH1111 Intermediate Algebra or MTH1100 Elementary/Intermediate Algebra</td>
<td>3</td>
<td>Placement Exam or MTH1100</td>
</tr>
<tr>
<td>or MTH2220 Organic Chemistry</td>
<td>3</td>
<td>MTH2220</td>
</tr>
<tr>
<td>or MTH2220 Survey of Calculus</td>
<td>3</td>
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</tr>
</tbody>
</table>

Important Note: Only courses in which a grade of “C” or higher is earned may be applied toward this Ranken degree.

COURSE DESCRIPTIONS

INT1113 Industrial Mechanical Systems Theory
This course covers the basics of drill presses, hand saws and associated hand tools. Students will examine mechanical fasteners and torque, discuss the fundamentals of blueprints, symbols and terms specific to industrial mechanical systems. Students will identify basic components such as bearings seals and gaskets and analyze power transmission devices including gears, chains, belts and couplings. Fluid transmission components including valves, black iron piping and pumps will be covered as well as basic rigging, lifting and equipment layout theories. Five credit hours.

INT1114 Industrial Mechanical Systems Shop
This course provides a hands-on application of all principles covered in INT1113, including basic mechanical hand tools and drill press operation, removal of frozen or damaged fasteners and installation of troubleshooting of various power transmission devices. Students will employ written documentation skills as applied to the industry. They will also apply Preventative and Predictive Maintenance procedures to increase equipment life and plant efficiency. Students will also demonstrate proper procedures to secure, support, lift and place loads. Eight credit hours.

INT1211 Welding/Metal Fabrication and Hydraulics Theory
Introduces safety, the correct use of tools and the fundamentals of welding. Covers processes like Shielded Metal Arc Welding ( SMAW), Gas Metal Arc Welding(MIG/GMAW) and Gas Tungsten Arc Welding (TIG). Introduces oxy-fuel cutting and welding. Concludes with hydraulic fundamentals, principles and circuit analysis. Five credit hours.

INT1212 Welding/Metal Fabrication and Hydraulics Shop
Provides hands-on exposure to mild steel, aluminum and stainless steel materials through structured shop procedures and practices. Students use plumbing techniques to implement pumps, motors, cylinders, directional control valves, metering and check-and-flow control valves in working circuits during the hydraulic portion of the semester. They disassemble the components for inspection, repair or replacement and final test for proper operation. Eight credit hours.

INT2111 Industrial Facilities Maintenance Theory
Provides a broad overview in three areas of study. Carpentry maintenance focuses on small construction projects, such as hanging drywall, hanging doors, suspended ceilings and other building and grounds maintenance skills. Pipe fitting and piping maintenance includes the practical application of mathematics as well as the safe and proper use of hand and power tools used for soldering, brazing and polyvinyl chloride (PVC) pipe and procedures used in the trade. The course also covers the mechanical refrigeration cycle, compressors and pressure temperature relationships. Five credit hours.

INT2112 Industrial Facilities Maintenance Shop
Provides hands-on application of principles covered in INT2111, including basic carpentry projects that teach the student to measure, layout and cut. Projects include the construction of an elevated wood and metal
These courses can be credited toward the Bachelor of Science degree. For students interested in furthering their education, Ranken is offering an Associate of Applied Science degree as a part of the evening program curriculum. You can earn your associate degree with a combination of Ranken’s standard evening school courses as well as our new online courses. You can also transfer credit from other accredited technical training programs, from other accredited technical training programs, or have your technical work experience evaluated for possible transfer credit. (30 technical credit hours required for graduation.) For all General Education course requirements, please turn to page 104.

INDUSTRIAL TECHNOLOGY (CONTINUED)

EVENING PROGRAM CERTIFICATE IN INDUSTRIAL TECHNOLOGY

Ranken evening program students can earn a certificate in Industrial Technology by pursuing a generalist program customized to suit individual needs and interests. These courses combine classroom and shop projects to provide overall instruction, hands-on training and experience in the practices and skills needed by area-wide manufacturing and industrial firms. These classes meet on Monday and Wednesday or Tuesday and Thursday evenings.

For students interested in furthering their education, these courses can be credited toward the Bachelor of Science in Applied Management (BSAM) degree. Important Note: Students may apply four courses from the menu list below for a total 24 credits necessary to qualify for an Industrial Technology certificate program are not Title IV eligible.

EVENING PROGRAM COURSES

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<td>EMT0100</td>
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<tr>
<td>Fabrication and Welding</td>
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<td>FWL0100</td>
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<td>Industrial Maintenance</td>
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<td>INT0100</td>
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<tr>
<td>Precision Machining</td>
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<td>PMT0111</td>
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<td>PLT0100</td>
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<tr>
<td>Stationary Engineering</td>
<td>6</td>
<td>STI0101</td>
</tr>
</tbody>
</table>

Total Technical Credit Hours for Certificate Completion: 24 minimum

ASSOCIATE OF APPLIED SCIENCE

Ranken is offering an Associate of Applied Science degree as a part of the evening program curriculum. You can earn your associate degree with a combination of Ranken’s standard evening school courses as well as our new online courses. You can also transfer credit from other accredited technical training programs, or have your technical work experience evaluated for possible transfer credit. (30 technical credit hours required for graduation.) For all General Education course requirements, please turn to page 104.

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</tbody>
</table>

Total Technical Credit Hours for Certificate Completion: 24 minimum

INDUSTRIAL TECHNOLOGY (CONTINUED)

ELECTRICAL MAINTENANCE

Emphasizes electrical safety and proper use of tools as students cover the basics of electricity. The course provides an overview of series, parallel and combination circuits as well as electrical systems. Students become familiar with both balanced and unbalanced systems. Introduces wiring methods including cable and conduit bending as well as surface metal raceway and flexible wiring systems. The course also covers standard switching circuits, basic service and feeder calculations, branch circuit requirements, along with an introduction to motor controls. Six credit hours.

EMT0100 Electrical Maintenance I

Six credit hours.

EMT0120 Electrical Maintenance II

Emphasizes maintenance and continued instruction of motor control circuits, ladder diagrams, control relays, motor starters and diagram reading. It also introduces students to troubleshooting programmable logic controllers (PLC). (Does not include programming of PLC.) The installation of a three-phase transformer with panel board feeding balanced and unbalanced loads is also covered. Six credit hours.

FABRICATION AND WELDING

FWL0110 Welding I

Students will learn the necessary skills for welding and cutting processes used in the welding and fabrication industry. Processes covered in this program include, Shielded Metal Arc Welding (SMAW/Electrode welding), Flux Cored Arc Welding (FCAW), Gas Metal Arc Welding (GMAW) and Gas Tungsten Arc Welding (GTAW), to be applied on various metals. The emphasis is to develop proper welding techniques in the flat and horizontal positions. The procedures for preparing materials—oxy-fuel cutting and carbon arc gouging—are included in the curriculum. Six credit hours.

FWL0120 Welding II

Focuses on the skills required to perform welds in various positions. Students will be prepared for the AWS qualification test in vertical Shield Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW) and Flux Cored Arc Welding (FCAW) on steel plate. Six credit hours.

MANUFACTURING DIVISION

INDUSTRIAL MAINTENANCE

INT0100 Industrial Maintenance Mechanics

Includes instruction in math, basic terms, bearings, seals, industrial pumps, power transmission, power transmission components, brakes, clutches, use of V-belts and fasteners. Also covers basic pneumatics, compressors and compressed gas systems. Six credit hours.

INT0100 Hydraulics, Millwright and Rigging

Includes instruction in the hydraulic transmission of force and energy, the operation of hydraulic pumps, hydraulic actuators, control of hydraulic energy through the use of pressure control valves, cylinders, directional control valves and flow control valves. The course also covers the millwright and rigging fundamentals of layout and leveling, ropes, knots, splices, wire rope, chins, weight calculations, CG cranes, hoists and ladders. Six credit hours.

PRECISION MACHINING

PMT0111 Engine Lathe Fundamentals

Students will concentrate on the vertical milling machine. They will learn turning, threading, taper turning and drilling operations. Students will learn setups such as, between centers, three jaw chucks and four jaw chucks. They will also have lessons on basic right angle trigonometry, print reading, drill presses, saws and lay-out. Six credit hours.

PMT0113 Milling Machine Fundamentals

The student will concentrate on the vertical milling machine. They will learn the set-up and operations of a mill. Students will also have lessons on basic right angle trigonometry, print reading, drill presses, saws and lay-out. Six credit hours.

PLUMBING

PLT0100 Pipelifting Theory and Practice

Covers the use of basic hand and power tools for cutting and threading steel pipe and cutting and joining copper pipe, using both hand and soft soldering methods. The course includes the principles of pipe dimensions and layout methods as it applies to the piping trade. Also, the course covers drain waste vent piping systems, the use of copper and cast iron and plastic pipe, along with related fittings. Six credit hours.

PLT0100 Plumbing Systems Theory and Practice

Covers plumbing with hands-on application and theories about plumbing safety, drainage, waste, vent systems, plumbing fixtures, plumbing appliances and hot and cold water supply systems. Plumbing system inspections and tests are included. Six credit hours.
INDUSTRIAL TECHNOLOGY (CONTINUED)

STE0120 Stationary Engineering
Covers boilers, including the construction of different styles, pressure capabilities, different ways of firing, safety devices and water level controls, including efficiencies, pollution, boiler auxiliaries such as feedwater heaters, softeners and feedwater treatment. Students tour an industrial boiler room and learn about pumps, both piston and centrifugal, methods of sizing, pressures and prime movers. Six credit hours.

STATIONARY ENGINEERING

FACILITIES TECHNOLOGY (CONTINUED)

EVENING PROGRAM CERTIFICATE IN FACILITIES TECHNOLOGY
Ranken evening program students can earn a certificate in Facilities Technology by pursuing a generalist program customized to suit individual needs and interests. These courses combine classroom and shop projects to provide overall instruction, hands-on training and experience in the maintenance practices and skills needed by area facilities, including universities, hospitals, hotels and industrial businesses. These classes meet on Monday and Wednesday or Tuesday and Thursday evenings.

For all General Education course requirements, please turn to page 110. For more information about the BSAM degree, please turn to page 104.

ASSOCIATE OF APPLIED SCIENCE
Ranken is offering an Associate of Applied Science degree as a part of the evening program curriculum. You can earn your associate degree with a combination of Ranken’s standard evening school courses as well as our new online courses. You can also transfer credit from other accredited technical training programs, or have your technical work experience evaluated for possible transfer credit. (30 technical credit hours required for graduation.)

For all General Education course requirements, please turn to page 110. For more information about the BSAM degree, please turn to page 104.

EVENING PROGRAM COURSES

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>CREDIT HOURS</th>
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<tbody>
<tr>
<td>BPR0100</td>
<td>Blueprint Reading</td>
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<td>EM0100</td>
<td>Electrical Maintenance I</td>
<td>6</td>
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<tr>
<td>EM0120</td>
<td>Electrical Maintenance II</td>
<td>6</td>
</tr>
<tr>
<td>CPR0110</td>
<td>Exterior/Interior Frame Construction</td>
<td>6</td>
</tr>
<tr>
<td>CPR0120</td>
<td>Interior Finish</td>
<td>6</td>
</tr>
<tr>
<td>HVA0100</td>
<td>Plumbing System</td>
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<tr>
<td>HVA0101</td>
<td>Electrical for HVACR</td>
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</tr>
<tr>
<td>INT100C</td>
<td>Home Inspection Training</td>
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</tr>
<tr>
<td>INT102C</td>
<td>Energy Audit Training</td>
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<td>CRP0110</td>
<td>Stationary Engineering</td>
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<td>CRP0120</td>
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<tr>
<td>SEG010C</td>
<td>Solar Photovoltaic (PV) Technology Training</td>
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<td>PIP0110</td>
<td>Pipelining Theory and Practice</td>
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<td>INT102C</td>
<td>Home Energy Audit Training</td>
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</table>

Total Technical Credit Hours for Certificate Completion: 24 (minimum)

MANUFACTURING DIVISION

ELECTRICAL MAINTENANCE

HVA0101 Electrical for HVACR
Study includes capacitors, current relays, potential relays and solid-state relays. Students practice methods used to recognize each relay and wire each relay circuit with its hermetic compressors. The course incorporates the wiring of basic fan relays, contactors and sequencers. Additionally, this course provides an overview of the different means of wiring, charging and problem diagnosis of domestic refrigerators and window air-conditioners. Troubleshooting through an electrical schematic is a staple of this course. Emphasis is placed on problem analysis of system operation. Six credit hours.

PLUMBING

PLT0110 Pipelining Theory and Practice
Covers the use of basic hand and power tools for cutting and threading steel pipe and cutting and joining copper pipe, using both hard and soft soldering methods. The course includes practical mathematics and layout methods as it applies to the piping trade. Also, the course covers drain waste vent piping systems, the use of copper and cast iron and plastic pipe, along with related fittings. Six credit hours.

PLT0100 Plumbing Systems Theory and Practice
Covers plumbing for the home owner or handyman, with hands-on application and theories about plumbing safety, drainage, waste, vent systems, plumbing fixtures, plumbing appliances and hot and cold water supply systems. Plumbing system inspections and tests are included. Six credit hours.

COURSE DESCRIPTIONS

CARPENTRY MAINTENANCE

CRP0110 Exterior/Interior Frame Construction
This course covers basic carpentry math calculations of fractions and decimals as well as right-angle geometry. Students will learn how to identify and safely operate different hand and portable/stationary power tools. The course also covers how to set up and operate leveling instruments. Concrete formwork, floor and wall framing and gable roof construction are covered in this course. Upon completion of the basic framework of the small-scale module of the residential structure, students will hang an exterior door and install vinyl siding, soffit and fascia on the exterior of the building. Students will install roof shingles and learn proper flashing and water prevention techniques. Six credit hours.

CRP0120 Interior Finish
This course covers the different aspects of interior finish work to be completed on the module constructed during CRP0110. Mathematical stair calculations and layout, as well as basic stair construction, is covered in this course. Residential drywall installation/patchwork and drywall finishing is covered. In this course, students will learn how to install different floor systems such as carpet, sheet vinyl, ceramic tile and laminate. They will also learn how to install a suspended ceiling. Upon completion of the ceiling and flooring, students will install an interior pre-hung door unit and finish the rest of the structure with base trim and window casing. The basic woodworking portion of this course will cover the fabrication of small woodworking projects, such as a bookcase or coat rack. Six credit hours.

HEATING, VENTILATION, AIR CONDITIONING & REFRIGERATION

HVA0100 Fundamentals of Heat Transfer and Domestic Applications
This course introduces the basics of refrigeration, including a description of what is taking place inside each component and the lines connecting them. Students learn to read a temperature-pressure chart and apply it to various refrigerants which are used in the trade. Common service procedures such as gauge installation, evacuation and recovery of refrigeration are also covered in the course. Students are exposed to trade measurements and are given theory behind what it takes to make a good solder and brazing connection on copper tubing. This course introduces students to pressures, temperatures and running times for refrigerators and room air conditioners and continues with charging, service and operation of domestic refrigerators and room air conditioners. Six credit hours.

HVA0101 Electrical for HVACR
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This course introduces the basics of refrigeration, including a description of what is taking place inside each component and the lines connecting them. Students learn to read a temperature-pressure chart and apply it to various refrigerants which are used in the trade. Common service procedures such as gauge installation, evacuation and recovery of refrigeration are also covered in the course. Students are exposed to trade measurements and are given theory behind what it takes to make a good solder and brazing connection on copper tubing. This course introduces students to pressures, temperatures and running times for refrigerators and room air conditioners and continues with charging, service and operation of domestic refrigerators and room air conditioners. Six credit hours.

HVA0101 Electrical for HVACR
Study includes capacitors, current relays, potential relays and solid-state relays. Students practice methods used to recognize each relay and wire each relay circuit with its hermetic compressors. The course incorporates the wiring of basic fan relays, contactors and sequencers. Additionally, this course provides an overview of the different means of wiring, charging and problem diagnosis of domestic refrigerators and window air-conditioners. Troubleshooting through an electrical schematic is a staple of this course. Emphasis is placed on problem analysis of system operation. Six credit hours.

PLUMBING

PLT0110 Pipelining Theory and Practice
Covers the use of basic hand and power tools for cutting and threading steel pipe and cutting and joining copper pipe, using both hard and soft soldering methods. The course includes practical mathematics and layout methods as it applies to the piping trade. Also, the course covers drain waste vent piping systems, the use of copper and cast iron and plastic pipe, along with related fittings. Six credit hours.

PLT0100 Plumbing Systems Theory and Practice
Covers plumbing for the home owner or handyman, with hands-on application and theories about plumbing safety, drainage, waste, vent systems, plumbing fixtures, plumbing appliances and hot and cold water supply systems. Plumbing system inspections and tests are included. Six credit hours.
FACILITIES TECHNOLOGY (CONTINUED)

COURSE DESCRIPTIONS

BLUEPRINT READING
BPPO1010 Blueprint Reading
Presents the fundamentals of general blueprint reading, projection drawings, common terms and symbols. Students will learn to interpret blueprints and symbols in the machine trades, the building trades and welding. Six credit hours.

ELECTRICAL MAINTENANCE
EMT0101 Electrical Maintenance I
Emphasizes electrical safety and proper use of tools as students cover the basics of electricity. The course provides an overview of series, parallel and combination circuits as well as electrical systems.

Students become familiar with both balanced and unbalanced systems. Introduces wiring methods including cable and conduit bending as well as surface metal raceway and flexible wiring systems. The course also covers standard switching circuits, basic service and feeder calculations, branch circuit requirements, along with an introduction to motor controls. Six credit hours.

EMT0120 Electrical Maintenance II
Emphasizes maintenance and continued instruction of motor control circuits, ladder diagrams, control relays, motor starters and diagram reading. It also introduces students to troubleshooting programmable logic controllers (PLC). It does not include programming of PLC. The installation of a three-phase transformer with panel board feeding balanced and unbalanced loads is also covered. Six credit hours.

STATIONARY ENGINEERING (LICENSE PREPARATION)
STE0110 Stationary Engineering
Covers boilers, including the construction of different styles, pressure capabilities, different ways of firing, safety devices and water level controls, efficiencies including efficiency of pollution, boiler auxiliaries such as feedwater heaters, softeners and feedwater treatment. Students tour an industrial boiler room and learn about pumps, both piston and centrifugal, methods of sizing, pressures and prime movers. Six credit hours.

STE0120 Stationary Engineering
Provides a history of steam engines over the last century with tours of steam engines still used today. Course covers the replacement of steam engines by turbines, their applications for both stand-alone (battery backup) and utility interactive systems (grid tied). Students will learn the basics of the photovoltaic system and their applications for both stand-alone and utility interactive systems showing all major components and subsystems, and indicate the locations of the PV source and output circuits, inverter input and output circuits, charge controller and battery circuits. This course is taught in accordance with the North American Board of Certified Energy Practitioners (NABCEP). PV entry level learning objectives and prepares students to take the NABCEP certification exam.

At the end of the course, the student will be able to build a complete system from ground up. Lastly, the course covers the business side of the solar industry and helps the student understand what they need to know to run a solar business. Six credit hours.

INT101C Home Inspection Training
This course will teach students the fundamentals of inspecting structure, exteriors, roofing, electrical, plumbing, heating/cooling systems, insulation, ventilation systems, report writing and business development and marketing strategies. After completion of this course, students will be able to identify and properly document defects of a residential property within the standards of the industry. They will be able to properly document their findings on an inspection report. They will also learn essential skills in working with realtors, mortgage brokers, attorneys and financial institutions that play a key role in real estate transactions. Six credit hours.

INT101C Home Inspection Training
Energy audits involve the demand grows to lower expensive energy costs and move towards a sustainable future. There are tax credits from cities and the federal government for homeowners who implement recommendations made as a result of an energy audit. In this course you will learn the fundamentals of building science—thermodynamics, heat systems and transfer, moisture and humidity, airflow, insulation, thermal boundaries, S.U.V values, pressure boundaries, air sealing, blower door technology, ventilation, building calculations, combustion science and testing and energy conservation strategies. Six credit hours.

EVENING PROGRAM CERTIFICATE IN SOLAR ENERGY SYSTEMS AND GREEN TECHNOLOGY

Solar energy programs provide the training graduates need to enter the rapidly emerging green technology fields. According to the U.S. Department of Energy, Photovoltaic (PV) technology is a young, growing high-tech industry that is going to create jobs and strengthen the economy.

PV makes use of the abundant energy of the sun and has little or no negative impact on our environment. It can be used in a wide range of products, from small consumer items to large commercial solar electric systems.

Within the next ten years, PV electricity will be competitive in price with traditional sources of electricity and will become widely utilized.

EVENING PROGRAM COURSES and CREDITS

EMT0110 Electrical Maintenance I (or equivalent) 6
SEG100C Solar Photovoltaic (PV) Technology Training 6

Total Technical Credit Hours for Certificate Completion 12

SOLAR ENERGY SYSTEMS AND GREEN TECHNOLOGY

EVENING PROGRAM COURSES and CREDITS

EMT0110 Electrical Maintenance I (or equivalent) 6
SEG100C Solar Photovoltaic (PV) Technology Training 6

Total Technical Credit Hours for Certificate Completion 12

EVENING PROGRAM COURSE HOURS PREREQUISITES

EMT0110 Electrical Maintenance I 6 EMT0101 Electrical Maintenance I (or equivalent)
SEG100C Solar Photovoltaic (PV) Technology Training 6 SEG100C Solar Photovoltaic (PV) Technology Training

The students will finish up the semester learning the basics of all industrial refrigeration with an emphasis on ammonia, efficiencies and safety. Six credit hours.

ADDITIONAL STAND-ALONE COURSES
SEG100C Solar Photovoltaic (PV) Technology Training
Students learn the basics of the photovoltaic system and their applications for both stand-alone (battery backup) and utility interactive systems (grid tied). Students will learn the basics of the photovoltaic system, design, size calculations and installation safety. The student will be able to draw one line electrical diagrams for interactive and stand-alone PV systems showing all major components and subsystems, and indicate the locations of the PV source and output circuits, inverter input and output circuits, charge controller and battery circuits. This course is taught in accordance with the North American Board of Certified Energy Practitioners (NABCEP). PV entry level learning objectives and prepares students to take the NABCEP certification exam.

At the end of the course, the student will be able to build a complete system from ground up. Lastly, the course covers the business side of the solar industry and helps the student understand what they need to know to run a solar business. Six credit hours.

INT101C Home Inspection Training
This course will teach students the fundamentals of inspecting structure, exteriors, roofing, electrical, plumbing, heating/cooling systems, insulation, ventilation systems, report writing and business development and marketing strategies. After completion of this course, students will be able to identify and properly document defects of a residential property within the standards of the industry. They will be able to properly document their findings on an inspection report. They will also learn essential skills in working with realtors, mortgage brokers, attorneys and financial institutions that play a key role in real estate transactions. Six credit hours.

INT101C Home Inspection Training
Energy audits involve the demand grows to lower expensive energy costs and move towards a sustainable future. There are tax credits from cities and the federal government for homeowners who implement recommendations made as a result of an energy audit. In this course you will learn the fundamentals of building science—thermodynamics, heat systems and transfer, moisture and humidity, airflow, insulation, thermal boundaries, S.U.V values, pressure boundaries, air sealing, blower door technology, ventilation, building calculations, combustion science and testing and energy conservation strategies. Six credit hours.

Students learn the basic types of the photovoltaic system and their applications for both stand-alone (battery backup) and utility interactive systems (grid tied). Students will learn the basics of the photovoltaic system, design, size calculations and installation safety. The student will be able to draw one line electrical diagrams for interactive and stand-alone PV systems showing all major components and subsystems, and indicate the locations of the PV source and output circuits, inverter input and output circuits, charge controller and battery circuits. This course is taught in accordance with the North American Board of Certified Energy Practitioners (NABCEP). PV entry level learning objectives and prepares students to take the NABCEP certification exam.

At the end of the course, the student will be able to build a complete system from ground up. Lastly, the course covers the business side of the solar industry and helps the student understand what they need to know to run a solar business. Six credit hours.

SEG100C Solar Photovoltaic (PV) Technology Training
Students learn the basic types of the photovoltaic system and their applications for both stand-alone (battery backup) and utility interactive systems (grid tied). Students will learn the basics of the photovoltaic system, design, size calculations and installation safety. The student will be able to draw one line electrical diagrams for interactive and stand-alone PV systems showing all major components and subsystems, and indicate the locations of the PV source and output circuits, inverter input and output circuits, charge controller and battery circuits. This course is taught in accordance with the North American Board of Certified Energy Practitioners (NABCEP). PV entry level learning objectives and prepares students to take the NABCEP certification exam.

At the end of the course, the student will be able to build a complete system from ground up. Lastly, the course covers the business side of the solar industry and helps the student understand what they need to know to run a solar business. Six credit hours.

SEG100C Solar Photovoltaic (PV) Technology Training
Students learn the basic types of the photovoltaic system and their applications for both stand-alone (battery backup) and utility interactive systems (grid tied). Students will learn the basics of the photovoltaic system, design, size calculations and installation safety. The student will be able to draw one line electrical diagrams for interactive and stand-alone PV systems showing all major components and subsystems, and indicate the locations of the PV source and output circuits, inverter input and output circuits, charge controller and battery circuits. This course is taught in accordance with the North American Board of Certified Energy Practitioners (NABCEP). PV entry level learning objectives and prepares students to take the NABCEP certification exam.

At the end of the course, the student will be able to build a complete system from ground up. Lastly, the course covers the business side of the solar industry and helps the student understand what they need to know to run a solar business. Six credit hours.
As new technologies continue to shape the manufacturing industry, companies are experiencing an immediate demand for machinists who are qualified to construct and maintain machines and equipment. Ranken’s Precision Machining Technology program provides a foundation for engineering and prepares students for employment in machining, Computerized Numerical Control (CNC) programming, inspection/quality control, maintenance and machine tool building. The state-of-the-art Haas Technical Center and Computer Aided Drafting (CAD)/Computer Aided Manufacturing (CAM) computer lab offers students the experience necessary to advance on the job learning the latest computerized machining technology. While the primary purpose of the program is training skilled, general machinists, students are also trained in various specialties, including CNC, CAD/CAM, inspection and quality control, engineering design and maintenance machining.

Due to the rapidly expanding use of sophisticated CNC machine tools, coupled with the demand for machinists generated by the local defense industry, the St. Louis area is experiencing a shortage in those trained in the latest technologies. Therefore, the employment outlook for PMT graduates continues to be exceptionally promising.

By analyzing a company’s end product, constructing the parts and maintaining various pieces of equipment on an ongoing basis, students are exposed to problem-solving skills and are trained to meet the machining needs of today’s technical industries. Instruction occurs on the latest state-of-the-art equipment.

As a testament to industry support of this program, Ranken has one of the largest Haas Technical Centers in the region. Students are able to train on the state-of-the-art Haas CNC machines, giving them exposure to cutting-edge technology. Students interested in completing the certificate of technology program will take all technical courses in the associate degree program and two general education courses.

**PMT1001 Introduction to Machining Theory**
Introduces students to an assortment of hand tools, measuring instruments and basic machine processes used in the machinist trade. Students will learn the safety and operation of machine tools such as a power saw, bench grinder, drill press and lathe, along with horizontal and vertical mills. Students learn to read and interpret blueprints in addition to planning the manufacturing process of a mechanical part. The course will also expose students to mathematical problems commonly used in the machinist trade, beginning with basic math and advancing through transposition of formulas, calculating speeds and feed rates, proportions and ratios and concluding with an introduction to trigonometry. Five credit hours.

**PMT1011 Computer Numerical Control Theory**
Introduces the student to programming and operation of Computerized Numerical Control (CNC) machine tools. Provides hands-on experience in programming, setting up and operating CNC equipment. Students will be provided with a blueprint and will be responsible for programming and editing a part, choosing the correct tooling and fixtureing, along with creating a setup sheet document upon completion of the project. Eight credit hours.

**PMT1012 Computer Numerical Control Lab**
Introduces the student to programming and operation of Computerized Numerical Control (CNC) machine tools. Provides hands-on experience in programming, setting up and operating CNC equipment. Students will be provided with a blueprint and will be responsible for programming and editing a part, choosing the correct tooling and fixtureing, along with creating a setup sheet document upon completion of the project. Five credit hours.

**PMT1022 CAD/CAM Lab**
Five credit hours.

**PMT1021 CAD/CAM Theory**
Five credit hours.

**PMT1020 Advanced Machining Theory**
Five credit hours.

**PMT1022 Advanced Machining Lab**
Five credit hours.

**PMT1010 Mathematics for the Machine Trade**
Five credit hours.

**PMT1012 Computer Numerical Control Lab**
Five credit hours.

**PMT1022 Computer Numerical Control Lab**
Five credit hours.

**PMT1020 Advanced Machining Theory**
Five credit hours.

**PMT1001 Introduction to Machining Theory**
Five credit hours.

**PMT1002 Introduction to Machining Lab**
Eight credit hours.

**PMT1010 Mathematics for the Machine Trade**
Six credit hours.

**PMT1012 Computer Numerical Control Lab**
Six credit hours.

**PMT1021 Computer Numerical Control Theory**
Six credit hours.

**PMT1022 Advanced Machining Lab**
Eight credit hours.

**PMT1022 Advanced Machining Lab**
Eight credit hours.

**PMT1010 Mathematics for the Machine Trade**
Five credit hours.

**PMT1012 Computer Numerical Control Lab**
Five credit hours.

**PMT1022 Advanced Machining Lab**
Five credit hours.

**PMT1020 Advanced Machining Theory**
Five credit hours.

**PMT1001 Introduction to Machining Theory**
Six credit hours.

**PMT1002 Introduction to Machining Lab**
Six credit hours.

**PMT1010 Mathematics for the Machine Trade**
Six credit hours.

**PMT1012 Computer Numerical Control Lab**
Six credit hours.

**PMT1022 Advanced Machining Lab**
Eight credit hours.

**PMT1022 Advanced Machining Lab**
Eight credit hours.

**PMT1010 Mathematics for the Machine Trade**
Five credit hours.

**PMT1012 Computer Numerical Control Lab**
Six credit hours.

**PMT1022 Advanced Machining Lab**
Six credit hours.

**PMT1020 Advanced Machining Theory**
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**PMT1001 Introduction to Machining Theory**
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**PMT1002 Introduction to Machining Lab**
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Six credit hours.

**PMT1012 Computer Numerical Control Lab**
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**PMT1022 Advanced Machining Lab**
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**PMT1012 Computer Numerical Control Lab**
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**PMT1020 Advanced Machining Theory**
Six credit hours.
EVENING PROGRAM COURSES

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<th>COURSE DESCRIPTIONS</th>
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<td>PMT0111 Engine Lathe Fundamentals</td>
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<td>PMT0211 Advanced Machining</td>
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<tr>
<td>PMT0213 CNC Programming</td>
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<tr>
<td>PMT0214 CAD/CAM</td>
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EVENING PROGRAM CERTIFICATE IN PRECISION MACHINING TECHNOLOGY

This machinist-level program consists of machining, metal processing theory, mathematics, blueprint reading, Computerized Numerical Control (CNC) programming, and Computer Aided Drafting/Computer Aided Manufacturing (CAD/CAM). The primary goal of the program is to develop fundamental machining skills on milling machines and lathes.

Sections can be taken as stand-alone sections or combined for a four-semester certificate. In order to receive the certificate, students must complete the following sections:

- PMT0111 Engine Lathe Fundamentals
- PMT0113 Milling Machine Fundamentals
- PMT0211 Advanced Machining
- PMT0213 CNC Programming
- PMT0214 CAD/CAM

ASSOCIATE OF APPLIED SCIENCE

Ranken is offering an Associate of Applied Science degree as a part of the evening program curriculum. You can earn your associate degree with a combination of Ranken’s standard evening school courses as well as our new online courses. You can also transfer credit from other accredited technical training programs, or have your technical work experience evaluated for possible transfer credit. (30 technical credit hours required for graduation.)

For all General Education course requirements, please refer to page 104. For more information about the BSAM degree, please turn to page 104.
FABRICATION AND WELDING TECHNOLOGY

Due to high demand, Ranken offers a Fabrication and Welding Technology program in a new state-of-the-art facility. The curriculum includes oxy-fuel cutting, Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW) and Gas Tungsten Arc Welding (GTAW). The theory for each of these processes is discussed along with proper joint design and proper welding techniques.

For students interested in furthering their education, these courses are creditable toward our Associate of Applied Science (AAS) and Bachelor of Science in Applied Management (BSAM) degrees. Please see our AAS and BSAM evening program offerings on page 104.

EVENING PROGRAM CERTIFICATE IN FABRICATION AND WELDING

The evening program curriculum for Fabrication and Welding includes oxy-fuel cutting, Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW), Gas Tungsten Arc Welding (GTAW), Flux Cored Arc Welding (FCAW). The theory for each of these processes is discussed along with proper joint design and proper welding techniques.

For students interested in furthering their education, these courses are creditable toward our Associate of Applied Science (AAS) and Bachelor of Science in Applied Management (BSAM) degrees. Please see our AAS and BSAM evening program offerings on page 104.

**CERTIFICATE OF TECHNOLOGY**

Blueprint reading and welding symbol interpretation are practiced throughout the course. The welding is done on plate and pipe on low carbon steel, stainless steel and aluminum. Several certification tests are offered in SMAW, GMAW and GTAW.

**COURSE DESCRIPTIONS**

FWL1100 Fundamentals of Welding Technology

Introduces students to welding and cutting processes in both theory and shop. The course provides an overview of various techniques, including Shielded Metal Arc Welding (SMAW), Flux Cored Arc Welding (FCAW), Gas Metal Arc Welding (MIG/GMAW) and Gas Tungsten Arc Welding (TIG/GTAW) to be applied on various metals. The emphasis is to develop proper welding techniques in all positions. Students will also learn the procedures for preparing materials using oxy-fuel cutting and carbon arc gouging. By the end of the course, students will be prepared for the American Welding Society (AWS) certification test and vertical SMAW, MIG/GMAW and FCAW on steel plates. Twelve credit hours.

FWL1110 Blueprint Reading and Quality Inspection

Offers an in-depth study of blueprint reading, basic computer aided design (CAD) and the ability to operate a CNC cutting table. Students will interpret prints and create new designs using AutoCAD® software and CNC programming. Three credit hours.

FWL1200 Welding Fabrication

This course builds upon skills and theories learned in the Fundamentals of Welding Technology course. Students will cut material with oxygen fuel cutting, carbon arc gouging and plasma cutting equipment. Students lay out, fabricate, fit and assemble structural, boiler tube and piping systems. Students will learn the necessary setup and operation of equipment used in the structural steel fabrication field. Students will use blueprints to fabricate parts that are commonly found in the structural steel industry. Twelve credit hours.

FWL1210 Fabrication Equipment Technology

This course offers an in-depth study of blueprint reading, basic computer aided design (CAD) and the ability to operate a CNC cutting table. Students will interpret prints and create new designs using AutoCAD® software and CNC programming. Three credit hours.

FWL1211 Welding Inspection and Print Reading

Focuses on the skills for stick welding mild steel pipe in various positions. Students will be prepared to receive a certification in pipe welding. Six credit hours.

FWL0101 Introduction to Manufacturing

Offers an in-depth study of the basic computerized equipment used in the manufacturing industry. Students will learn the basic principles of manufacturing. Six credit hours.

FWL0122 Structural Fabrication

Focusing on fabricating and the cutting and welding of components in the structural steel fabrication field. Students will learn the necessary setup and operation of equipment used in the industry. They will also learn to fabricate parts by using blueprint formats. Six credit hours.

**MANUFACTURING DIVISION**
FABRICATION AND WELDING TECHNOLOGY (CONTINUED)

FWL0123 Chassis Fabrication
This course focuses on the ability to cut, weld and fabricate components in the race car chassis field. Students will learn the setup and operation of equipment used in the industry. They will also learn to fabricate parts using blueprint formats. Six credit hours.

FWL0112 CNC Cutting/Blueprint Reading
Covers the programming, set up and operation of a plasma cutting table. Students are also prepared in advanced blueprint reading and drawing interpretation. Six credit hours.

Ranken’s flexible evening programs allow you to advance your career without slowing down at work. Whether you are seeking a degree, attaining a new certification, or attending an industry seminar, Ranken offers an education that is available when you are.

Advanced Degree Options & General Education