

INDUSTRIAL TECHNOLOGIES

The following programs of study are available at the Kirtland M-TEC in Gaylord.

IMPORTANT NOTE: Welding classes will be offered at the Roscommon campus through the Winter semester of 2013 only. After that time, welding courses will only be available at the M-TEC in Gaylord. Students who begin their program in Roscommon will need to plan to complete their program requirements in Gaylord if they have not been completed by the end of the Winter semester, 2013.

Certificates

- *Industrial Maintenance*
- *Outdoor Power Engines*
- *Welding & Fabricating*

Associate in Applied Science

- *Industrial Maintenance*
- *Outdoor Power Engines*
- *Welding & Fabricating*

Partnership Programs

- *Davenport University*
- *Ferris State University*
- *Franklin University*

See information on our partnership programs on the web at

<http://www.kirtland.edu/students/transferfrom/>

Foundation

Kirtland Community College recognizes the importance of students possessing basic academic skills in English, reading, and mathematics in order to successfully complete college-level courses. Therefore, all entry-level students are required to demonstrate their proficiency in basic academic skills, as these courses are the foundation for success in all programs. The student's advisor will indicate which of the following courses need to be taken based on ACT scores or COMPASS placement testing results. It is highly recommended that students take these courses during the first semester in order to prepare for the road ahead, as well as possibly satisfying prerequisites needed for more advanced courses. Specific courses needed may be tracked below. *Students must plan additional time to complete their program requirements if placement results demonstrate the need to begin with preparatory courses (courses numbered less than 10000).*

- ENG-10000 Writing Lab (if required) Mathematics: _____
 English: _____ Reading: _____

For more information, please contact the Industrial Technologies Department.

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INDUSTRIAL MAINTENANCE / M-TEC Campus
Certificate of Completion (CIND3)

Minimum Credits: 30
Contact Hours: 46.88

Core Courses (3.5 credits, 87.5 classroom hours):

Course	Title	Credits	Classroom Hours
COR-10001	Basic Safety	0.5	12.5
COR-10002	Introduction to Construction Math	0.4	10
COR-10003	Introduction to Hand Tools	0.4	10
COR-10004	Introduction to Power Tools	0.4	10
COR-10005	Introduction to Construction Drawings	0.4	10
COR-10006	Basic Rigging	0.6	15
COR-10007	Basic Communication Skills	0.3	7.5
COR-10008	Employability Skills	0.3	7.5
COR-10009	Intro to Materials Handling	0.2	5

Industrial Maintenance, Level 1 (4.9 credits, 122.5 classroom hours):

IND-11000	Orientation to the Trade	.10	2.5
IND-11001	Tools of the Trade	.20	5.0
IND-11002	Fasteners and Anchors	.20	5.0
IND-11003	Oxyfuel Cutting	.70	17.5
IND-11004	Gaskets and Packing	.40	10.0
IND-11005	Craft-Related Mathematics	.60	15.0
IND-11006	Construction Drawings	.50	12.5
IND-11007	Pumps and Drivers	.20	5.0
IND-11008	Introduction to Valves	.20	5.0
IND-11009	Introduction to Test Instruments	.30	7.5
IND-11010	Material Handling and Hand Rigging	.60	15.0
IND-11011	Mobile and Support Equipment	.40	10.0
IND-11012	Lubrication	.50	12.5

Industrial Maintenance, Level 2 (6.4 credits, 160 classroom hours):

IND-12000	Basic Layout	.80	20.0
IND-12001	Introduction to Piping Components	.20	5.0
IND-12002	Copper and Plastic Piping Practices	.20	5.0
IND-12003	Introduction to Ferrous Metal Piping Practices	.20	5.0
IND-12004	Identifying, Installing and Maintaining Valves	.40	10.0
IND-12005	Hydrostatic and Pneumatic Testing	.40	10.0
IND-12006	Introduction to Bearings	.60	15.0
IND-12007	Low Pressure Steam Systems	.40	10.0
IND-12008	High Pressure Steam Systems and Auxiliaries	.80	20.0
IND-12009	Distillation Towers and Vessels	.80	20.0
IND-12010	Heaters, Furnaces, Heat Exchangers, Cooling Towers	1.2	30.0
IND-12011	Introduction to Tube Work	0.4	10.0

Industrial Maintenance, Level 3 (7 credits, 155 classroom hours):

IND-23000	Advanced Trade Math	1.2	30.0
IND-23001	Precision Measuring Tools	.80	20.0
IND-23002	Installing Bearings	.80	20.0
IND-23003	Installing Couplings	.60	15.0
IND-23004	Setting Baseplates and Prealignment	1.2	30.0
IND-23005	Conventional Alignment	1.2	30.0
IND-23006	Installing Belt and Chain Drives	.40	10.0
IND-23007	Installing Mechanical Seals	.80	20.0

Industrial Maintenance, Level 4 (6.8 credits, 170 classroom hours):

IND-24000	Preventive and Predictive Maintenance	.40	10.0
IND-24001	Advanced Blueprint Reading	1.0	25.0
IND-24002	Compressors and Pneumatic Systems	1.4	35.0
IND-24003	Reverse Alignment	1.2	30.0
IND-24004	Laser Alignment	1.0	25.0
IND-24005	Introduction to Supervisory Skills	.60	15.0
IND-24006	Troubleshooting and Repairing Pumps	.40	10.0
IND-24007	Troubleshooting and Repairing Gearboxes	.80	20.0

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Electives (1.4 credits, 35 classroom hours):

	Technical electives approved by advisor (Choose from: CAP-20001 through 20004, CPT, ELT, HVC, IND, MPT, PLB, and/or WLD)	1.4	35
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After completing the certificate, students may continue in Associate in Applied Science: Industrial Maintenance (below):

INDUSTRIAL MAINTENANCE / M-TEC Campus	Minimum Credits: 60
Associate in Applied Science (DIND3)	Contact Hours: 77.88-85.88

Course	Title	Credits	Classroom Hours
	Industrial Maintenance Certificate (listed above)	30	750
EDT-11000	Detailing with AutoCAD	3	64
EDT-13000	Fundamentals of MasterCAM	3	48

Communications (9-10 credits):

ENG-10000	Writing Lab (if required)	0-1	32
ENG-10303	English Composition I w/Computers	3	48
ENG-10403 Or ENG-10602	English Composition II w/Computers Or Technical Writing	3	48
SPE-10500 Or SPE-11400	Fundamentals of Speech Or Intro to Interpersonal & Public Comm	3	48

Humanities/Social Science (8-11 credits):

POL-10100	Introduction to American Government	3	48
	Humanities elective	2-4	32-64
	Any Social Science Elective	3-4	48-64

Math/Natural Science (6-9 credits):

MTH-12000	Intermediate Algebra or higher (excluding MTH-20500 or MTH-20600)	3-4	48-64
	Any Science course with a lab	3-5	48-80

Summary—Industrial Maintenance--Associate in Applied Science

	Credits	Classroom Hours
IND Certificate of Completion	30	750
Engineering Design Technologies	7	128
General Education	23	368-496
Total	60	1,246-1,374



OUTDOOR POWER ENGINES / M-TEC Campus

Certificate of Completion (CODP0)

Minimum Credits: 30
Contact Hours: 39-41

Introduction

The Outdoor Power Engines program prepares students for employment as repair technicians for motorcycles, watercraft, snowmobiles, ATVs, and other two and four cycle engines. The program provides competency-based learning experiences including theory and hands-on labs as well as internship opportunities. Students concentrate on the overall functions of the engines and diagnose or troubleshoot issues for repair. Students and graduate of this program have extensive opportunities for employment or transfer for further study with the nationally accredited and recognized educational leader in the field--Universal Technical Institute (UTI). After completing the Certificate: Outdoor Power Engines requirements, students may continue in Associate in Applied Science: Outdoor Power Engines.

Course	Title	Credits	Classroom Hours
CAP-20003	Internship/Service Learning	3	72
OPE-10001	Two & Four Cycle Engines Level 1	3	64
OPE-11032	Two & Four Cycle Engines Level 2	3	64
OPE-14000 Or AUT-16401	Small Engine Electricity Or Basic Electricity	3	64
OPE-20100	Outdoor Power Engines Capstone	3	64
OPE-20310 Or OPE-20510	Power Sports Equipment I Or Watercraft I	3	64

Metal Machining Level 1 (4.18 credits, 100 classroom hours):

MPT-10272	Machine Tool Safety	0.17	4.0
MPT-10273	Identifying Surface Finishes	0.08	2.0
MPT-10274	Shop Math-Speeds & Feeds	0.21	5.0
MPT-10275	Sharpening Drill Bits	0.25	6.0
MPT-10276	Drilling on a Press	0.17	4.0
MPT-10277	Power Tap on the Drill Press	0.25	6.0
MPT-10278	Drill Press Project	0.58	14.0
MPT-10279	Band Saw Blade Welding	0.25	6.0
MPT-10280	Vertical Band Saw Project	0.25	6.0
MPT-10281	Maintaining the Lathe	0.17	4.0
MPT-10282	Grinding Lathe Tools	0.25	6.0
MPT-10283	Facing on the Lathe	0.21	5.0
MPT-10284	Aligning Lathe Centers	0.17	4.0
MPT-10285	Cutting External Threads	0.50	12.0
MPT-10286	Dial In Vise/Tram in Head	0.21	5.0
MPT-10287	Fly Cutter & End Mill/Square Block	0.21	5.0
MPT-10288	Digital Read/Drill, Tap, & Ream	0.25	6.0

Welding Level I (4 credits, 96 classroom hours):

WLD-10120	Welding Safety	0.13	3.0
WLD-10121	AWS Joints/Positions/Welds/Symbols	0.13	3.0
WLD-10122	OAW Terms & Equipment Setup	0.17	4.0
WLD-10123	OAW Stringer Beads & Joints 1G-1F	0.36	9.0
WLD-10124	BW Stringer Beads & Joints	0.29	7.5
WLD-10125	Cutting OA/Plasma Cutting/Carbon Arc	0.45	11.0
WLD-10126	Identifying Good Welds per AWS	0.13	3.0
WLD-10127	SMAW Terms/Identify Electrodes	0.17	4.0
WLD-10128	SMAW Set-up & Weld Stringer Beads	0.42	10.0
WLD-10129	SMAW Welding Joints/Flat Pos/1G-1F	0.33	9.6
WLD-10130	GMAW Set-up & Weld Stringer Beads	0.42	10.0
WLD-10131	GMAW Welding Joints/Flat Pos/1G-1F	0.29	7.5
WLD-10132	FCAW Set-up & Weld Stringer Beads	0.42	10.0
WLD-10133	GCAW Welding Joints/Flat Pos/1G-1F	0.29	7.0

and electives from the following lists for a total of 30 program credits (3.92 credits, 72-92 classroom hours):

Engineering Design Technology	Manufacturing Processes Technology	Welding
EDT-XXX EDT electives	MPT-XXX MPT electives	WLD-XXX Welding electives

OUTDOOR POWER ENGINES / M-TEC Campus

Associate in Applied Science (DODP0)

Minimum Credits: 60

Contact Hours: 68-80

After completing the Certificate: Outdoor Power Engines requirements, students may continue in Associate in Applied Science: Outdoor Power Engines, as listed below.

Course	Title	Credits	Classroom Hours
	Outdoor Power Engines Certificate	30	
EDT-11000	Detailing with AutoCAD	3	64

Communications (9-10 credits):

ENG-10000	Writing Lab (if required)	0-1	32
ENG-10303	English Composition I w/Computers	3	48
ENG-10403 Or ENG-10602	English Composition II w/Computers Or Technical Writing	3	48
SPE-10500 Or SPE-11400	Fundamentals of Speech Or Intro to Interpersonal & Public Comm	3	48

Humanities/Social Science (8-11 credits):

POL-10100	Introduction to American Government	3	
	Humanities elective	2-4	32-64
	Any Social Science Elective	3-4	48-64

Math/Natural Science (6-9 credits):

MTH-12000	Intermediate Algebra or higher	3-4	48-64
	Any Science Course with lab	3-5	48-80

Technical Elective, if needed (0-1): (See advisor for guidance.)

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WELDING & FABRICATING

Certificate of Completion (CWF1)

Minimum Credits: 31
Contact Hours: 45-46

Introduction

Kirtland's program in Welding & Fabricating is designed to provide instruction in the development of techniques and understanding of quality weldments. The program includes practice in shielded metal arc welding, oxy-acetylene welding and cutting, gas tungsten arc welding, flux cored arc welding, and gas metal arc welding processes. Students will have an understanding of the metallurgical aspects of the weld structure, welding equipment construction, welding codes, planning and estimating and applying current industrial techniques. This program leads to an Associate in Applied Science degree which has a minimum of 62 credit hours. Upon successful completion, students may be eligible to transfer for a bachelor's degree. Welding students should take into consideration that the program must be customized for transfer in order to fulfill the requirements of a four-year institution.

Electrical (2.8-3.0 credits, 64-70 classroom hours):

Course	Title	Credits	Classroom Hours
AUT-16401	Basic Electricity	3	64
Or OPE-14000	Or Small Engine Electricity	3	64
Or ELT-10103	Or Intro to Electrical Circuits	.30	7.5
And ELT-10104	And Electrical Theory	.30	7.5
And ELT-10110	And Basic ELT Construction Drawings	.20	7.5
And ELT-10112	And Electrical Test Equipment	.30	5.0
And ELT-10202	And Alternating Current	.60	17.5
And ELT-10210	And Grounding & Bonding	.50	15.0
And ELT-20407	And Basic Electronic Theory	.80	10.0

Engineering Design Technology (3 credits, 64 classroom hours):

EDT-11000	Detailing with AutoCAD	3	64
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Metal Machining Level 1 (4.18 credits, 100 classroom hours):

MPT-10272	Machine Tool Safety	0.17	4.0
MPT-10273	Identifying Surface Finishes	0.08	2.0
MPT-10274	Shop Math-Speeds & Feeds	0.21	5.0
MPT-10275	Sharpening Drill Bits	0.25	6.0
MPT-10276	Drilling on a Press	0.17	4.0
MPT-10277	Power Tap on the Drill Press	0.25	6.0
MPT-10278	Drill Press Project	0.58	14.0
MPT-10279	Band Saw Blade Welding	0.25	6.0
MPT-10280	Vertical Band Saw Project	0.25	6.0
MPT-10281	Maintaining the Lathe	0.17	4.0
MPT-10282	Grinding Lathe Tools	0.25	6.0
MPT-10283	Facing on the Lathe	0.21	5.0
MPT-10284	Aligning Lathe Centers	0.17	4.0
MPT-10285	Cutting External Threads	0.50	12.0
MPT-10286	Dial In Vise/Tram in Head	0.21	5.0
MPT-10287	Fly Cutter & End Mill/Square Block	0.21	5.0
MPT-10288	Digital Read/Drill, Tap, & Ream	0.25	6.0

Metallurgy (2.22 credits, 52 classroom hours):

MPT-20319	Property of Metals/Physical Metallurgy	0.13	3.0
MPT-20320	Constitution of Alloys	0.17	4.0
MPT-20321	Carbon and Alloy Steels	0.13	3.0
MPT-20322	Heat and Surface Treat for Steel	0.13	3.0
MPT-20323	Cast Irons	0.13	3.0
MPT-20324	Light Metals and Alloys	0.13	3.0
MPT-20325	Lead, Tin, and Zinc	0.13	3.0
MPT-20326	Introduction to Metallurgy	0.46	11.0
MPT-20327	Examining and Identifying Metals	0.13	3.0
MPT-20328	Fundamentals of Welding & Brazing/Casting	0.13	3.0
MPT-20329	Fundamentals of Welding Stainless Steel	0.13	3.0
MPT-20330	Testing Metals	0.42	10.0

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Welding Level I (4 credits, 96 classroom hours):

WLD-10120	Welding Safety	0.13	3.0
WLD-10121	AWS Joints/Positions/Welds/Symbols	0.13	3.0
WLD-10122	OAW Terms & Equipment Setup	0.17	4.0
WLD-10123	OAW Stringer Beads & Joints 1G-1F	0.36	9.0
WLD-10124	BW Stringer Beads & Joints	0.29	7.5
WLD-10125	Cutting OA/Plasma Cutting/Carbon Arc	0.45	11.0
WLD-10126	Identifying Good Welds per AWS	0.13	3.0
WLD-10127	SMAW Terms/Identify Electrodes	0.17	4.0
WLD-10128	SMAW Set-up & Weld Stringer Beads	0.42	10.0
WLD-10129	SMAW Welding Joints/Flat Pos/1G-1F	0.33	9.6
WLD-10130	GMAW Set-up & Weld Stringer Beads	0.42	10.0
WLD-10131	GMAW Welding Joints/Flat Pos/1G-1F	0.29	7.5
WLD-10132	FCAW Set-up & Weld Stringer Beads	0.42	10.0
WLD-10133	GCAW Welding Joints/Flat Pos/1G-1F	0.29	7.0

Welding Level 2 (4 credits, 96 classroom hours):

WLD-10240	GMAW Welding Joints/Hor Pos/2G-2F	0.17	4.0
WLD-10241	FCAW Welding Joints/Hor Pos/2G-2F	0.17	4.0
WLD-10242	GMAW Welding Joints/Ver Pos/3G-3F	0.17	4.0
WLD-10243	FCAW Welding Joints/Ver Pos/3G-3F	0.17	4.0
WLD-10244	GMAW Welding Joints/Ovhd Pos/4G-4F	0.21	5.0
WLD-10245	FCAW Welding Joints/Ovhd Pos/4G-4F	0.21	5.0
WLD-10246	GMAW Pulse Arc/Flat Pos/1G-1F	0.17	4.0
WLD-10247	GMAW Metal Core Arc Wld/Flat/1G-1F	0.17	4.0
WLD-10248	GMAW Welding Joints Aluminum/All Ps	0.33	8.0
WLD-10249	Welding Blueprint Reading	0.17	4.0
WLD-10250	Fab Project Using GMAW or FCAW	0.5	12.0
WLD-10251	SMAW Multi-Pass Stringer/Flat/1F	0.42	10.0
WLD-10252	SMAW Multi-Pass Weave/Flat/1F	0.42	10.0
WLD-10253	SMAW Welding Joints/Hor Pos/2G-2F	0.36	9.0
WLD-10254	SMAW Welding Joints/Ver Pos/3G-3F	0.36	9.0

Welding Level 3 (4 credits, 96 classroom hours):

WLD-10370	SMAW Welding Joints/Ovhd Pos/4G-4F	0.5	12.0
WLD-10371	Fabricate Project Using SMAW	0.5	12.0
WLD-10372	Welding Metallurgy	0.9	22.0
WLD-10373	GTAW Setup & Weld Stringer Beads	0.42	10.0
WLD-10374	GTAW Weld Joints/Steel/Flat/1G-1F	0.42	10.0
WLD-10375	GTAW Weld Jts/StainSteel/Flat/1G-1F	0.42	10.0
WLD-10376	GTAW Weld Joints/Alum/Flat/1G-1F	0.42	10.0
WLD-10377	GTAW Weld Joints/Steel/Hor/2G-2F	0.42	10.0

Welding Level 4 (4 credits, 96 classroom hours):

WLD-20450	GTAW Weld Jts/Stain Steel/Hor/2G-2F	0.5	12.0
WLD-20451	GTAW Weld Joints/Alum/Hor/2G-2F	0.5	12.0
WLD-20452	GTAW Weld Joints/Steel/Ver/3G-3F	0.5	12.0
WLD-20453	GTAW Weld Jts/Stain Steel/Ver/3G-3F	0.5	12.0
WLD-20454	GTAW Weld Joints/Alum/Ver/3G-3F	0.5	12.0
WLD-20455	GTAW Weld Joints/Steel/Ovhd/4G-4F	0.5	12.0
WLD-20456	GTAW Weld Jts/StainSteel/Ovhd/4G-4F	0.5	12.0
WLD-20457	GTAW Weld Joints/Alum/Ovhd/4G-4F	0.5	12.0

Technical Electives from the following lists for a total of 31 program credits (2.2 credits, 53 classroom hours)

Engineering Design Technology	Manufacturing Processes Technology	Welding
EDT-xxxxx EDT Electives	MPT-xxxxx MPT Electives	WLD-xxxxx Welding electives

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WELDING & FABRICATING TECHNOLOGY

Associate in Applied Science (DWAF1)

Minimum Credits: 62

Contact Hours: 83-91

After completing the Certificate: Welding & Fabricating requirements, students may continue for the Associate in Applied Science: Welding & Fabricating Technology, as listed below.

Course	Title	Credits	Classroom Hours
	Welding & Fabricating Certificate	31	680-780.1

Welding Level 5 (4 credits, 96 classroom hours):

WLD-20510	Intro to Pipe Welding	.21	5.0
WLD-20511	Pipe 2G Fixed Position	.67	16
WLD-20512	Pipe Welding 5G Fixed Pos/Vert Up	1.04	25.0
WLD-20513	Pipe Welding 5G Fixed Pos/Vert Down	1.04	25.0
WLD-20514	Pipe Welding 6G Fixed Position	1.04	25.0

Welding Level 6 (4 credits, 96 classroom hours):

WLD-20606	6 Welder Qual & Projects	4	96
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Communications (9-10 credits):

ENG-10000	Writing Lab (if required)	0-1	32
ENG-10303	English Composition I w/Computers	3	48
ENG-10403 Or ENG-10602	English Composition II w/Computers Or Technical Writing	3	48
SPE-10500 Or SPE-11400	Fundamentals of Speech Or Intro to Interpersonal & Public Comm	3	48

Humanities/Social Science (8-11 credits):

POL-10100	Introduction to American Government	3	
	Humanities elective	2-4	32-64
	Any Social Science Elective	3-4	48-64

Math/Natural Science (6-9 credits):

MTH-12000	Intermediate Algebra or higher	3-4	48-64
	Any Science Course with lab	3-5	48-80

