

ENGINEERING/MANUFACTURING & INDUSTRIAL TECHNOLOGY PATHWAY

This pathway includes careers related to technologies necessary to design, develop, install or maintain physical systems. These may include engineering and related technologies, manufacturing technology, precision production and construction.

DEGREES/CERTIFICATES

- Automotive Service Technology
- Aviation Technology
- Climate Control Systems (HVAC)
- Customer Energy Specialist
- Electronic Technology /ELT
- Electronic Technology / Microcomputer Support

TRANSFER PROGRAMS

The first two-years of a student's college education usually consist of general study courses, introductory courses in a major and/or program of study, and selected electives. Refer to pages 38-40 for additional information on transfer and MACRAO. Academic advisors assist students in planning their transfer program. They can also provide transfer guide sheets indicating JCC courses that meet the requirements of various programs of study at four-year colleges. Sample curricula for a few popular transfer programs are included.

- Pre-Architecture
- Engineering

AUTOMOTIVE SERVICE TECHNOLOGY ASSOCIATE IN APPLIED SCIENCE

Designed for the student preparing for a career in the automotive field. Classroom activities provide students an opportunity to learn theory and test-taking skills to successfully pass the Michigan and/or ASE certification examinations. Shop activities provide students an opportunity to become proficient in the testing, diagnosing and servicing the various systems of the automobile. All eight areas of an automotive certification are thoroughly covered, and when combined with general and related courses, lead to an Associate of Applied Science degree. This provides the background for employment and advancement in various automotive related occupations such as service technician, service writer, service manager, proving grounds testing technician, shop owner, parts specialist, automotive machinist, alternate fuel vehicle technician, technical sales and motor sports.

Our Toyota corporate sponsored connection is called T-TEN. As part of the Toyota Technical Education Network, students have the option to enter into the Toyota T-TEN program. This prepares students to work as a technician in a Toyota dealership. These students take the same automotive classes

as other students with some important differences. Toyota provides T-TEN students with: Toyota work uniforms, Toyota training materials, Toyota vehicles and special tools to work with in the shop, assistance in finding a sponsoring Toyota dealership to do paid co-ops, Toyota course exit exams and Toyota certification upon successful completion of the program.

Our Ford corporate sponsored connection is called MLR. As part of the Ford Maintenance and Light Repair network, students have the option to enter into the Ford MLR program. This prepares students to work as a technician in Ford, Lincoln, or Mercury dealerships. These students take the same automotive classes as other students with some important differences. Ford MLR students concentrate on electrical systems, climate control, brakes, and suspension and steering. They utilize Ford training materials including service manuals, electrical/vacuum troubleshooting manuals, technical service bulletins, use Ford approved tools and equipment, work on Ford automobiles/light trucks, and upon successful completion of the course and the Ford Multimedia Training exit exam are Ford certified with Service Technician Specialty Training credentials. With these credentials students will receive assistance in obtaining Ford, Lincoln, or Mercury dealership placement to work in the areas of certification.

Minimum credits:	63
Minimum cumulative GPA:	2.0
Minimum JCC credits:	12
MACRAO agreement:	No

Contact Program Staff, Les Coxon at 517-796-8541 or Dan Livingston at 517-796-8540.

GENERAL EDUCATION REQUIREMENTS — (17 credits)

ENGLISH — (3 credits)

ENG 131 Writing Experience	3
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MATHEMATICS — (3 credits)

Choose any one of the following:

MTH 110 Pre-Algebra	3
MTH 112 Business Math	3
MTH 120 Beginning Algebra	4
MTH 131 Intermediate Algebra	4
MTH 133 Introduction to Probability & Statistics	3
MTH 140 Pre-calculus	5
MTH 151 Calculus I	4

SCIENCE — (4 credits)

Choose one of the following:

BIO 131 General Biology	4
BIO 132 Human Biology	4
BIO 151 General Botany	4
BIO 152 General Zoology	4
BIO 155 Human Anatomy	5

CEM 121 Chemistry of Life	4
CEM 131 General Chemistry	4
CEM 132 Organic and Biological Chemistry	4
CEM 141 General Inorganic Chemistry	5
CEM 142 General Inorganic Chemistry & Analysis	5
GEL 160 Introduction to Geology	4
NSC 131 Contemporary Science	4
PHY 131 Conceptual Physics	4
PHY 151 Astronomy	4
PHY 231 College Physics I	4
PHY 251 Modern University Physics II	5

SOCIAL SCIENCE (3 credits)**Choose one of the following:**

ANT 131 Introduction to Anthropology	3
CRJ 101 Criminal Law	3
CRJ 104 Criminal Justice Psychology	3
CRJ 111 Introduction to Criminal Justice	4
CRJ 120 Human Relations for Corrections	3
CRJ 127 Corrections Law	3
ECN 231 Macroeconomics	3
ECN 232 Microeconomics	3
GEO 131 Physical Geography	3
HIS 120 Ancient History	3
HIS 131 Western Civilization to 1555	4
HIS 132 Western Civilization 1955 to Present	4
HIS 231 Development of the US through the Civil War	3
HIS 232 Development of the US from the Civil War	3
PLS 141 American National Government	3
PSY 140 Introduction to Psychology	4
PSY 152 Social Psychology	3
PSY 251 Abnormal Psychology	3
PSY 252 Developmental Psychology	3
SOC 152 Social Psychology	3
SOC 231 Principles of Sociology	3
SOC 236* Women in a Changing Society	3

HUMANITIES — (3 credits)**Choose one of the following:**

ART 111 Art History: Prehistoric - 1400	3
ART 112 Art History: Renaissance - Present	3
ENG 210 Introduction to Film	3
ENG 236* Women in a Changing Society	3
ENG 246 Short Story & Novel	4
ENG 247 Poetry and Drama	3
ENG 249 African-American Literature	3
ENG 254 Children's Literature	3
ENG 255 American Literature 19th Century	3
ENG 256 American Literature 20th Century	3
ENG 257 World Literature I	3
HUM 131 Cultural Connections	3
MUS 130 Survey of Non-Western Music	3
MUS 131 Understanding Music	3

MUS 133 Music Education	3
MUS 151 Music Theory I	4
MUS 152 Music Theory II	4
PHL 231 Intro to Philosophy	3
PHL 232 Logic	3
THR 116 Introduction to Theatre	3

**Cannot be double-counted; prefix chosen at registration cannot be changed.*

HEALTH/PHYSICAL FITNESS — (1 credit)**Choose one of the following:**

HPF 160 Wellness	1
HPF 168 Weight Training & Conditioning	2
HPF 221 Jazz Techniques	3
HPF 268 Advanced Weight Training	2
HPF 277 Stress Management	2
HPF 278 Stress Management for Parents	2

AUTOMOTIVE SERVICE TECHNOLOGY CORE**REQUIREMENTS— (38 credits)**

AUT 102 Engine Performance I	4
AUT 103 Engine Performance II	4
AUT 105 Automotive Brakes	3
AUT 106 Suspension and Steering	3
AUT 108 Automotive Air Conditioning/Heating	3
AUT 112 Electrical Systems I	3
AUT 113 Electrical Systems II	3
AUT 201 Engine Repair	4
AUT 202 Automatic Transmission	4
AUT 204 Manual Drivetrain	3
AUT 210 Co-op Experience	4

AUTOMOTIVE SERVICE TECHNOLOGY ELECTIVES— (8 credits)

AUT 101 General Service	2
AUT 118 Diesel Fundamentals	2
AUT 211 Co-Op Experience	4
AUT 212 Co-Op Experience	4
AUT 245 Auto Lab Experience	4

- or select electives from classes in BUS or ELT

AUTOMOTIVE SERVICE TECHNOLOGY — CERTIFICATE

This program provides classroom and laboratory experiences that prepare the student for entry-level employment in the automotive service field. It also prepares students for the Michigan and/or Automotive Service Excellence (ASE) certification tests.

Minimum credits:	38
Minimum cumulative GPA:	2.0
Minimum JCC credits:	12
MACRAO agreement:	No

Contact Program Staff Les Coxon at 517-796-8541 or Dan Livingston at 517-796-8540

AUTOMOTIVE SERVICE TECHNOLOGY CORE REQUIREMENTS — (34 credits)

AUT 105 Automotive Brakes	3
AUT 106 Suspension and Steering	3
AUT 102 Engine Performance I	4
AUT 103 Engine Performance II	4
AUT 108 Automotive Air Conditioning/Heating	3
AUT 112 Electrical Systems I	3
AUT 113 Electrical Systems II	3
AUT 201 Engine Repair	4
AUT 202 Automatic Transmission	4
AUT 204 Manual Drivetrain	3

RELATED REQUIREMENTS — (4 credits)

AUT 210 Co-op	4
AUT 211 Co-op	4
AUT 212 Co-op	4

SKILL SET CREDENTIAL — WHEEL SERVICE

Contact Program Staff, Les Coxon at 517-796-8541 or Dan Livingston at 517-796-8540.

Minimum credits:	12
Minimum cumulative GPA:	2.0
Minimum JCC credits:	12
MACRAO agreement:	No

AUT 101 General Service	2
AUT 105 Automotive Brakes	3
AUT 106 Suspension and Steering	3
AUT 210 Co-op	4

SKILL SET CREDENTIAL — DRIVEABILITY

Contact Program Staff, Les Coxon at 517-796-8541 or Dan Livingston at 517-796-8540.

Minimum credits:	21
Minimum cumulative GPA:	2.0
Minimum JCC credits:	12
MACRAO agreement:	No

AUT 102 Engine Performance I	4
AUT 103 Engine Performance II	4
AUT 108 Automotive Air Conditioning/Heating	3
AUT 112 Electrical Systems I	3
AUT 113 Electrical Systems II	3
AUT 211 Co-op	4

SKILL SET CREDENTIAL — POWERTRAIN

Contact Program Staff, Les Coxon at 517-796-8541 or Dan Livingston at 517-796-8540.

Minimum credits:	15
Minimum cumulative GPA:	2.0
Minimum JCC credits:	12
MACRAO agreement:	No

AUT 201 Engine Repair	4
AUT 202 Automatic Transmission	4
AUT 204 Manual Drivetrain	3
AUT 212 Co-op	4

AVIATION FLIGHT TECHNOLOGY—ASSOCIATE IN APPLIED SCIENCE

Basic ground school and flight instruction needed to meet the requirements of the Federal Aviation Administration's Commercial Pilot certificate with instrument and flight instructor ratings.*

Federal and/or Michigan law may require that enrollees in the Aviation Program undergo an FBI background check. Contact the Director of Aviation with questions.

Minimum credits:	60
Minimum cumulative GPA:	2.0
Minimum JCC credits:	12
MACRAO agreement:	No

GENERAL EDUCATION REQUIREMENTS — (17 credits)**ENGLISH — (3 credits)**

ENG 131 Writing Experience 3

MATHEMATICS — (3 credits)**Choose one of the following:**

MTH 131 Intermediate Algebra 4

MTH 133 Intro to Probability and Statistics 3

SCIENCE — (4 credits)**Choose one of the following:**

PHY 131 Our Physical World 4

PHY 231 College Physics 4

SOCIAL SCIENCE — (3 credits)

PLS 141 American National Government 3

HUMANITIES — (3 credits)

HUM 131 Cultural Connections 3

HEALTH/PHYSICAL FITNESS— (1 credit)**Choose one of the following:**

HPF 160 Wellness 1

HPF 168 Weight Training & Conditioning 2

HPF 221 Jazz Techniques 3

HPF 277 Stress Management 2

HPF 278 Stress Management for Parents 2

AVIATION TECHNOLOGY CORE REQUIREMENTS — (35 credits)

AFT 100 Basic Maneuvers 2

AFT 110 Primary Ground School 3

AFT 115 Primary Flight I 4

AFT 120 Primary Flight II 4

AFT 125 Commercial Ground School 3

AFT 130 Commercial Flight I 4

AFT 135 Instrument Ground School 3

AFT 140 Commercial Flight II 4

AFT 200 Commercial Flight III 4

AFT 205 Commercial Flight IV 4

AVIATION TECHNOLOGY ELECTIVES

Select electives from all classes (except course letters CED, CEU, CFO, CJT, CSS, TEN) so that degree equals 60 credits.

ADDITIONAL REQUIREMENT

Complete the current FAA requirements to meet the minimum flight time hours (see Flight Director and/or FAA for current requirements).

* All enrollees must be capable of attaining the FAA class II medical certificate.

**SKILL SET CREDENTIAL —
COMPUTER AIDED DRAFTING (CAD)**

Minimum credits:18

Minimum cumulative GPA:2.0

Minimum JCC credits:12

MACRAO agreement:No

ITE 083 Windows Workshop1

CAD 121 Technical Drafting I4

CAD 122 Technical Drafting II4

CAD 131 Computer Assisted Drafting I - Auto CAD I3

- or CAD 140 Computer Assisted Drafting I –
Micro Station3

CAD 132 Computer Assisted Drafting II - AutoCAD II3

- or CAD 141 Computer Assisted Drafting II –
Micro Station3

CAD 133 Computer Assisted Drafting III - AutoCAD III3

**CUSTOMER ENERGY SPECIALIST —
CERTIFICATE**

Minimum credits:44

Minimum cumulative GPA:2.0

Minimum JCC credits:12

MACRAO agreement:No

GENERAL EDUCATION REQUIREMENTS — (9 credits)

ENG 131 Writing Experience3

ENG 232 Technical & Business Writing3

SPH 231 Communication Fundamentals3

BUSINESS RELATED REQUIREMENTS — (16 credits)

ACC 211 General Accounting4

- or ACC 231 Principles of Accounting I4

BUS 101 Marketing3

BUS 131 Introduction to Business3

BUS 135 Business Law I3

ITE 101 Information Technology Education3

TECHNICAL CORE REQUIREMENTS — (19 credits)

CAD 121 Technical Drafting I4

CAD 131 Computer Assisted Drafting I(AutoCAD)3

- or 140 Computer Assisted Drafting I(MicroStation)3

CAD 132 Computer Assisted Drafting II (AutoCAD)3

- or 141 Computer Assisted Drafting II(MicroStation)3

ELT 120 Circuit Analysis I4

ELT 125 Circuit Analysis II3

PHY 161 Industrial Physics2

ELECTRONIC TECHNOLOGY/ELT — ASSOCIATE IN APPLIED SCIENCE

Electronic technologists are employed in such fields as digital computer maintenance, voice and data communications, radio and television broadcasting, medical electronic instrumentation, high-tech manufacturing, research and development in laboratory settings.

Students may also work to achieve A+ certification for employment as personal computer service professionals. A+ certification is the "journeyman's card" for computer technologists, which is recognized by Comp TIA. The non-profit Computing Technology Industry Association (Comp TIA) is widely recognized as the standard for qualified computer service professionals.

Minimum credits:	71
Minimum cumulative GPA:	2.0
Minimum JCC credits:	12
MACRAO agreement:	No

GENERAL EDUCATION REQUIREMENTS — (19 credits)

ENGLISH — (3 credits)

ENG 131 Writing Experience	3
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MATHEMATICS — (5 credits)

MTH 140 Pre-calculus	5
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SCIENCE — (4 credits)

PHY 231 College Physics I	4
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SOCIAL SCIENCE — (3 credits)

Choose one of the following:

PLS 141 American National Government	3
ECN 231 Macroeconomics	3

HUMANITIES — (3 credits)

Choose one of the following:

PHL 231 Introduction to Philosophy	3
PHL 232 Logic	3

HEALTH/PHYSICAL FITNESS — (1 credit)

Choose one of the following:

HPF 160 Wellness	1
HPF 168 Weight Training & Conditioning	2
HPF 221 Jazz Techniques	3
HPF 277 Stress Management	2
HPF 278 Stress Management for Parents	2

RELATED REQUIREMENTS — (11 credits)

Choose one of the following groups:

TRANSFER GROUP (General ELT option)

ITE 182 Programming in C++	3
• or ITE 134 Computer Programming - Visual Basic	3
MTH 151 Calculus I	4
PHY 232 College Physics II	4

NON-TRANSFER GROUP (General ELT option)

ITE 182 Programming in C++	3
• or ITE 134 Computer Programming - Visual Basic	3

AND

Choose 8 credits from the following: any CAD, ELT, ITE course that best meet your educational goals.

ELT CORE REQUIREMENTS — (41 credits)

ELT 120 Circuit Analysis I	4
ELT 125 Circuit Analysis II	3
ELT 130 Electronics I	4
ELT 140 Introduction to Digital Electronics	4
ELT 157 Programmable Logic Controllers	4
ELT 250 Electric Motors and Controls	4
ELT 270 Communications Circuits	4
ELT 280 Digital Systems	4
ITE 101 Information Technology Education	3
ITE 233 A+ Hardware	3
ITE 235 A+ Software	3
ITE 237 A+ Test Prep	1

And electives to meet 71 credit degree requirement.

ELECTRONIC TECHNOLOGY/ MICROCOMPUTER SUPPORT — ASSOCIATE IN APPLIED SCIENCE

Electronic technologists are employed in such fields as digital computer maintenance, voice and data communications, radio and television broadcasting, medical electronic instrumentation, high-tech manufacturing, research and development in laboratory settings.

Students may also work to achieve A+ certification for employment as personal computer service professionals. A+ certification is the "journeyman's card" for computer technologist, which is recognized by Comp TIA. The non-profit Computing Technology Industry Association (Comp TIA) is widely recognized as the standard for qualified computer service professionals.

Minimum credits:	70
Minimum cumulative GPA:	2.0
Minimum JCC credits:	12
MACRAO agreement:	No

GENERAL EDUCATION REQUIREMENTS — (19 credits)**ENGLISH — (3 credits)**

ENG 131 Writing Experience	3
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MATHEMATICS — (5 credits)

MTH 140 Pre-calculus	5
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SCIENCE — (4 credits)

PHY 231 College Physics I	4
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SOCIAL SCIENCE — (3 credits)**Choose one of the following:**

PLS 141 American National Government	3
ECN 231 Macroeconomics	3

HUMANITIES — (3 credits)**Choose one of the following:**

PHL 231 Introduction to Philosophy	3
PHL 232 Logic	3

HEALTH/PHYSICAL FITNESS — (1 credit)**Choose one of the following:**

HPF 160 Wellness	1
HPF 168 Weight Training & Conditioning	2
HPF 221 Jazz Techniques	3
HPF 277 Stress Management	2
HPF 278 Stress Management for Parents	2

RELATED REQUIREMENTS — (11 credits)**MICROCOMPUTER SUPPORT GROUP**

ITE 182 Programming in C++	3
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AND

Choose 8 credits from the following: any CAD, ELT, ITE, course that best meet your educational goals.

MICROCOMPUTER CORE REQUIREMENTS — (40 credits)

ELT 119 DC Fundamentals	3
ELT 124 AC Fundamentals	2
ELT 129 Semiconductor Devices	2
ELT 139 Digital Electronic Fundamentals	3
ELT 280 Digital Systems	4
ITE 047 Operating Systems: UNIX	1
ITE 083 Windows Workshop	1
ITE 067 MS DOS Workshop	1

ITE 101 Information Technology Education	3
ITE 134 Visual Basic 2 for Windows	3
ITE 233 A+ Hardware Component	3
ITE 235 A+ O/S Component	3
ITE 237 A+ Certification Exam Preparation	1
ITE 239 Network+ Networking Fundamentals Component ..	3
ITE 241 N+ Protocols	3
ITE 243 N+ Test Prep	1
BUS 155 Human Relations in Business	3

And electives to meet 70 credit degree requirement.

ELECTRONIC TECHNOLOGY/ELT — CERTIFICATE

Minimum credits:	36
Minimum cumulative GPA:	2.0
Minimum JCC credits:	12
MACRAO agreement:	No

ELECTRONIC TECHNICIAN CORE REQUIREMENTS — (32 credits)

ITE 101 Information Technology Education	3
ITE 233 A+ Hardware Component	3
ITE 235 A+ O/S Component	3
ITE 237 A+ Certification Exam Preparation	1
ELT 120 Circuit Analysis I	4
ELT 125 Circuit Analysis II	3
ELT 130 Electronics I	4
ELT 140 Introduction to Digital Electronics	4
MTH 131 Intermediate Algebra	4
ENG 131 Writing Experience	3

RELATED REQUIREMENTS — (4 credits)

ELT 157 Introduction to PLCS	4
ELT 250 Electric Motors and Controls	4
ELT 280 Digital Systems	4
ITE 134 Visual Basic 2 for Windows	3

TECHNICAL ELECTIVES

Select classes from CAD, ELT, ITE to meet your 36 credit certificate requirement.

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ELECTRONIC TECHNOLOGY/ MICROCOMPUTER SUPPORT — CERTIFICATE

Minimum credits:	36
Minimum cumulative GPA:	2.0
Minimum JCC credits:	12
MACRAO agreement:	No

MICROCOMPUTER CORE REQUIREMENTS— (33 credits)

ELT 119 DC Fundamentals	3
ELT 124 AC Fundamentals	2
ELT 129 Semiconductor Devices	2
ELT 139 Digital Electronic Fundamentals	3
ITE 047 Operating Systems: UNIX	1
ITE 083 Windows Workshop	1
ITE 067 MS DOS Workshop	1
ITE 101 Information Technology Education	3
ITE 233 A+ Hardware Component	3
ITE 235 A+ O/S Component	3
ITE 237 A+ Certification Exam Preparation	1
ITE 239 Network+ Networking Fundamentals Component ..	3
MTH 131 Intermediate Algebra	4
ENG 131 Writing Experience	3

RELATED REQUIREMENTS — (3 credits)

ELT 157 Introduction to PLCs	4
ELT 250 Electric Motors and Controls	4
ELT 280 Digital Systems	4
ITE 134 Visual Basic 2 for Windows	3

TECHNICAL ELECTIVES

Select classes from CAD, ELT, ITE to meet your 36 credit certificate requirement

APPRENTICESHIP INFORMATION

Apprenticeship programs are available in many trades in cooperation with an employer or a joint apprenticeship committee representing labor and management. The U.S. Department of Labor/Bureau of Apprenticeship and Training registers and monitors the programs to ensure quality in apprenticeship programs nationwide.

Apprenticeship training involves classroom and on-the-job training over a span of usually four years. The process of applying knowledge on the job provides the apprentice with the opportunity to develop the necessary skills for a particular trade.

Upon completion of all employer-specified coursework and the required hours of on-the-job instruction, the employer may recommend that the apprentice receive a completion certificate from the U.S. Department of Labor/Bureau of Apprenticeship and Training.

SKILL SET CREDENTIAL

The “Skill Set Credentials” process is a building block approach to completing a trade certificate program. Students can choose to complete the skill set credentials depending upon the level of skill and knowledge desired. Students can apply for a skill set credential upon completion of the required courses.

CLIMATE CONTROL TECHNOLOGY — ASSOCIATE IN APPLIED SCIENCE

Provides skills required for heating, air conditioning and refrigeration. Training areas include application techniques for basic and advanced air conditioning, heat pumps, fossil fuels, solar energy and refrigeration.

Minimum credits:	60
Minimum cumulative GPA:	2.0
Minimum JCC credits:	12
MACRAO agreement:	No

GENERAL EDUCATION REQUIREMENTS — (17 credits)

ENGLISH — (3 credits)

ENG 131 Writing Experience	3
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MATHEMATICS — (3-4 credits)

MTH 120 Beginning Algebra	3-4
• or higher level mathematics course	

SCIENCE — (4 credits)

Choose one of the following:

BIO 131 General Biology	4
CEM 121 Chemistry of Life	4
CEM 131 General Chemistry	4
CEM 141 General Inorganic Chemistry	5
GEL 160 Introduction to Geology	4
NSC 131 Contemporary Science	4
PHY 131 Conceptual Physics	4
PHY 151 Astronomy	4

SOCIAL SCIENCE — (3 credits)

Choose one of the following:

PLS 141 American National Government	3
ECN 231 Macroeconomics	3

HUMANITIES — (3 credits)

Choose one of the following:

PHL 231 Introduction to Philosophy	3
PHL 232 Logic	3

HEALTH/PHYSICAL FITNESS (1 credit)**Choose one of the following:**

HPF 160 Wellness	1
HPF 168 Weight Training & Conditioning	2
HPF 221 Jazz Techniques	3
HPF 277 Stress Management	2
HPF 278 Stress Management for Parents	2

CLIMATE CONTROL CORE REQUIREMENTS — (27 credits)

AIT 117 Beginning Sheet Metal	2
AIT 118 Advanced Sheet Metal	2
AIT 121 Introduction to HVAC	3
AIT 123 Application of HVAC Technology	3
AIT 131 Basic HVAC Electricity/Controls	2
AIT 135 Refrigeration/Air Conditioning I	3
AIT 136 Refrigeration/Air Conditioning II	3
AIT 137 Advanced HVAC Electricity/Controls	2
AIT 141 Basic Heating	2
AIT 142 Advanced Heating	2
AIT 200 Mechanical Code	2
AIT 201 Refrigeration Certification	1

RELATED REQUIREMENTS (6 credits)**Choose two of the following:**

BUS 155 Human Relations in Business	3
ENG 232 Technical & Business Writing	3
ITE 101 Information Technology Education	3

ADDITIONAL REQUIREMENTS

EMS 110 CPR & First Aid	2
• or current Adult CPR & First Aid Certification	

ELECTIVES

Select electives from classes in any courses (except those with prefixes CED, CEU, CFO, CSS) so that degree equals 60 credits.

CLIMATE CONTROL SYSTEMS — CERTIFICATE

Climate Control Technology curriculum provides skills required for heating, air conditioning and refrigeration. Training areas include application techniques for basic and advanced air conditioning, heat pumps, fossil fuels, solar energy and refrigeration.

Minimum credits:	35
Minimum cumulative GPA:	2.0
Minimum JCC credits:	12
MACRAO agreement:	No

CLIMATE CONTROL SYSTEMS CORE REQUIREMENTS — (35 credits)

AIT 117 Beginning Sheet Metal	2
AIT 118 Advanced Sheet Metal	2
AIT 121 Introduction to HVAC	3
AIT 123 Application of HVAC Technology	3
AIT 131 Basic HVAC Electricity/Controls	2
AIT 135 Refrigeration/Air Conditioning I	3
AIT 136 Refrigeration/Air Conditioning II	3
AIT 137 Advanced HVAC Electricity/Controls	2
AIT 141 Basic Heating	2
AIT 142 Advanced Heating	2
AIT 200 Mechanical Code	2
AIT 201 Refrigeration Certification	1
ENG 232 Technical & Business Writing	3
MTH 110 Basic Math	3
• or higher level math course	3

ADDITIONAL REQUIREMENTS

EMS 110 CPR & First Aid	2
• or current Adult CPR & First Aid Certification	

ELECTRICIAN — ASSOCIATE IN APPLIED SCIENCE

Minimum credits:	60
Minimum cumulative GPA:	2.0
Minimum JCC credits:	12
MACRAO agreement:	No

GENERAL EDUCATION REQUIREMENTS — (17 credits)**ENGLISH — (3 credits)**

ENG 131 Writing Experience	3
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MATHEMATICS — (3 credits)

MTH 131 Intermediate Algebra or higher	3
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SCIENCE — (4 credits)

PHY 231 College Physics I	4
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SOCIAL SCIENCE — (3 credits)**Choose one of the following:**

PLS 141 American National Government	3
ECN 231 Macroeconomics	3

HUMANITIES — (3 credits)**Choose one of the following:**

PHL 231 Introduction to Philosophy	3
PHL 232 Logic	3

HEALTH/PHYSICAL FITNESS — (1 credit)**Choose one of the following:**

HPF 160 Wellness	1
HPF 168 Weight Training & Conditioning	2
HPF 221 Jazz Techniques	3
HPF 277 Stress Management	2
HPF 278 Stress Management for Parents	2

ELECTRICIAN CORE REQUIREMENTS — (40 credits)

ELT 074 National Electric Code	2
ELT 120 Circuit Analysis I	4
ELT 125 Circuit Analysis II	3
ELT 130 Electronics I	4
ELT 140 Introduction to Digital Electronics	4
ELT 148 Electrical Math I	2
ELT 149 Electrical Math II	2
ELT 150 Residential Wiring	2
ELT 151 Commercial Wiring	2
ELT 152 Industrial Wiring	2
ELT 215 Electrical Troubleshooting	2
ELT 220 Industrial Motion Control	3
ELT 250 Electrical Motors and Controls	4
ELT 260 Basic Programmable Controllers	4

ADDITIONAL REQUIREMENTS

EMS 110 CPR & First Aid	2
• or current Adult CPR & First Aid Certification	

ELECTIVES

Complete elective credits in any discipline to reach 60 credits.

ELECTRICIAN — CERTIFICATE

Minimum credits:	40
Minimum cumulative GPA:	2.0
Minimum JCC credits:	12
MACRAO agreement:	No

REQUIRED COURSES

ELT 074 National Electric Code	2
ELT 120 Circuit Analysis I	4
ELT 125 Circuit Analysis II	3
ELT 130 Electronics I	4
ELT 140 Introduction to Digital Electronics	4
ELT 148 Electrical Math I	2
ELT 149 Electrical Math II	2
ELT 150 Residential Wiring	2
ELT 151 Commercial Wiring	2
ELT 152 Industrial Wiring	2
ELT 215 Electrical Troubleshooting	2
ELT 220 Industrial Motion Control	3

ELT 250 Electrical Motors and Controls	4
ELT 260 Basic Programmable Controllers	4

ADDITIONAL REQUIREMENTS

EMS 110 CPR & First Aid	2
• or current Adult CPR & First Aid Certification	

**SKILL SET CREDENTIAL —
ELECTRICAL BASICS**

Completion of this program provides solid electrical foundation for the person seeking electrical or industrial maintenance mechanic training.

Minimum credits:	13
Minimum cumulative GPA:	2.0
Minimum JCC credits:	12
MACRAO agreement:	No

ELT 120 Circuit Analysis I	4
ELT 125 Circuit Analysis II	3
ELT 150 Residential Wiring	2
ELT 152 Industrial Wiring	2
ELT 148 Electrical Math I	2

PRE-REQUISITE COURSES

MTH 110 Pre-Algebra	3
• or pass course placement	

**TRANSFER PROGRAMS —
PRE-ARCHITECTURE**

Architects design buildings and other structures. These buildings must be attractive as well as functional, safe and economical, and must suit the needs of the people who use them. Architects take all these things into consideration when they design buildings and other structures.

Architects provide a wide variety of professional services to individuals and organizations planning a construction project. They may be involved in all phases of development, from the initial discussion of general ideas with the client through the entire life of the facility. Their duties require a number of skills - design, engineering, managerial, communication and supervisory.

SAMPLE CURRICULUM FOR PRE-ARCHITECTURE**First Year, Fall Semester**

ENG 131, MTH 140, ART 103, ART 112, MACRAO Social Science course

First Year, Winter Semester

ENG 132 or 232, MTH 151, ART 152, PHL 232

Second Year, Fall Semester

PHY 231, HUM 131, MACRAO Social Science course, Electives

Second Year, Winter Semester

PHY 232, MACRAO Social Science course, Electives

ENGINEERING

Engineers apply science, mathematics, and professional judgment to solve technical problems in industry and society. Today engineers are expected to contribute more than their technical competence. They are concerned with the impact of their work on society.

SAMPLE CURRICULUM FOR ENGINEERING**First Year, Fall Semester**

ENG 131, MTH 151, CEM141, CPS 175*, EGR 153**

First Year, Winter Semester***

ENG 132, MTH 154, PHL 232, CPS 177

First Year, Spring Semester

ECN 231, Social Science and/or Humanities courses

Second Year, Fall Semester

MTH 251, PHY 251, EGR 261 Second Year, Winter Semester
MTH 254, PHY 252, EGR 262

**Not required but recommended to prepare for CPS 177*

***Not required but strongly recommended*

****Students transferring to Michigan State University take BIO 131*

HEALTH SCIENCES CAREER PATHWAY

This pathway includes careers related to the promotion of health as well as the treatment of injuries, conditions and disease. This may include medicine, dentistry, nursing, therapy and rehabilitation, nutrition, fitness and hygiene and animal health care.

Students in Nursing or Allied Health programs that require clinical rotations at local hospitals will be required to submit to a drug test. If the student tests positive for illicit drugs he/she will be removed from the program. Criminal background checks may also be performed and may prevent admission if failed.

DEGREES/CERTIFICATES**ALLIED HEALTH**

- Diagnostic Medical Sonographer
- Diagnostic Medical Sonographer - Vascular
- Diagnostic Medical Sonographer - Echocardiography
- Emergency Medical Service , Paramedic , EMT
- Medical Assistant

- Medical Receptionist/Transcriptionist
- Medical Receptionist/Insurance Biller
- Radiography

NURSING

- RN (Associate Degree in Nursing, ADN)
- Practical Nurse (LPN)
- LPN to RN

TRANSFER PROGRAMS IN HEALTH SCIENCES PATHWAY

The first two years of college education usually consist of general education courses, introductory courses in the major and/or program of study, and selected electives. Refer to Pages 38-40 for additional information on transfer and MACRAO. Academic advisors will assist students in planning their transfer program. They can also provide transfer guide sheets indicating JCC courses that meet the requirements of various programs of study at four-year colleges. Sample curricula for a few popular transfer programs are included.

MEDICAL LABORATORY TECHNOLOGY:

- A joint program agreement between Jackson Community College and Kellogg Community College - [AAS]
- Allied Health with Siena Heights JCC & University of Michigan - [BSN]
- Dental Hygiene
- Medical Sciences [pre-medicine, pre-dentistry, pre-chiropractic]
- Physical Therapy
- Pre-Veterinary Science

DIAGNOSTIC MEDICAL SONOGRAPHY — ASSOCIATE IN APPLIED SCIENCE

A sonographer is the allied health professional who, for diagnostic purposes, uses high frequency sound waves to create cross-sectional images of the patient's anatomy. Sonographers work in professional harmony with both the radiologist and the clinical physician. Sonographers are required to demonstrate a great deal of independent judgment.

The diagnostic medical sonography (DMS) program is one of only 80+ accredited by the Commission for Accreditation of Allied Health Educational Programs (CAAHEP) in the United States. It is a two-year program leading to an Associate in Applied Science degree. Prerequisite work must be completed prior to acceptance to the program. The curriculum consists of integrated educational and clinical course work with a