

TECHNOLOGY AND OCCUPATIONAL SCIENCES

PROGRAM OFFICE

School of Technology and Applied Sciences

101 D. J. Jacobetti Center

Phone: 906-227-2067

Fax: 906-227-1549

Web Page: www.nmu.edu/technology

Department Head: To be named

Technology and Occupational Sciences at NMU

The School of Technology and Occupational Sciences offers a variety of one-, two- and four-year programs. The one- and two-year programs provide students with the knowledge and training necessary to assume skilled or technician-level positions in a variety of service or technical areas. These technical areas include automotive, aviation, collision repair, construction, cosmetology, electrical line technician, heating-air conditioning, hospitality, and industrial maintenance. In addition to offering technical programs traditionally identified with a community college, the department offers baccalaureate degree programs in construction and hospitality management.

The department's programs are designed to ladder into more advanced programs. Students in two-year certificate and associate degree programs can apply course work completed as part of the one- and two-year programs toward a bachelor's degree in the School of Technology and Applied Sciences.

The aviation maintenance technology associate degree and certificate programs are accredited by the Department of Transportation Federal Aviation Administration Certification.

Department Facilities and Equipment

- Airplanes (8)
- Auto Service Laboratory
- Collision Repair Laboratory
- Heating, Ventilation, Air Conditioning and Refrigeration Laboratory
- Helicopters (2)
- Industrial Maintenance Laboratory
- Professional Cosmetology Laboratory
- Professional Kitchen Laboratories

Hospitality management students operate and manage the white tablecloth restaurant Chez Nous during the winter semester as well as the Culinary Cafe during both the fall and winter semesters. In addition, students deliver several outstanding banquet and catering functions throughout the year.

Student Organizations

- American Culinary Federation Upper Michigan Chapter
- Aviation Maintenance Club
- Aviation Purchasing Co-op
- Culinary Students of NMU
- Hair Razors
- NMU Constructors
- Professional Aviation Maintenance Association

Department/Program Policies

Programs have substantial "hands-on" components; safety is a major responsibility. Students are expected to wear proper foot gear, safety glasses and dress for the lab environment. Tools are required for several programs. Students in AMT, CN, COS, CRT, HM, HV, PT, IM or WD courses are required to provide many of their own hand tools.

Aviation

All students are required to join the Aviation Purchasing Co-op. This co-op purchases the material and supplies students use in the lab section of the program over the standard two-year period. The purchase price is \$50 each semester (\$200 total). Students are required to have a basic tool set. Admission to AMT courses is limited to students majoring in aviation maintenance technology.

Cosmetology

The curriculum followed is set by the State of Michigan. Students must complete 1,500 clock hours for this program; attendance is mandatory. Successful completion of this program and the 1,500 requisite clock hours qualifies graduates to take the state board test for licensure in Michigan.

Students in baccalaureate degree programs may apply up to six credits of cosmetology (COS), practical nursing (PN) and surgical technology (ST) courses combined toward graduation unless otherwise prohibited. Students in associate degree programs may apply three credits of these courses combined toward graduation, and those in certificate programs other than cosmetology, practical nursing and surgical technology may apply two credits of these courses combined toward graduation unless otherwise prohibited.

Cosmetology Instructor

Entrance into this program requires a current Michigan license in cosmetology and two years of experience. The State of Michigan requires 500 hours of additional education for this certification.

BACHELOR DEGREE PROGRAMS

Liberal Studies: Complete information on the liberal studies requirements and additional graduation requirements, including the health promotion requirement, is in the "Liberal Studies Program and Graduation Requirements" section of this bulletin.

Courses within each major that can be used to satisfy liberal studies requirements are listed with the Roman numeral (in brackets) that coincides with the liberal studies division the course falls under.

Construction Management Major

This major prepares students to be competent in coordinating all phases of building construction including estimating, scheduling, writing contracts, purchasing materials and working with sub-contractors and material suppliers to ensure the job gets done on time and within budget. Graduates may begin as project managers, field engineers, estimators, assistant project managers or superintendents. Students are strongly urged to meet with their adviser to select a minor that will support their career goals.

Total Credits Required for Degree	129
Liberal Studies	30-40
Health Promotion	2
Technical Concentration	43
CN 107 Construction Documents	3
CN 151 Introduction to Construction	3
CN 154 Construction Surveying and Layout	3
CN 156 Construction Systems and Methods	3
CN 158 Concrete	3
WT 161 Wood Processing I	2
CN 251 Construction Field Operations	2
CN 252 Codes and Inspection	3
CN 278 Mechanical Systems	3
CN 283 Construction Estimating	3
CN 353 Soils and Foundations	3
CN 357 Legal Aspects of Construction	3
CN 358 Bidding Strategies	3
CN 450 Project Control	3
CN 459 Construction Management	3
Other Required Courses	40
ACT 230 Principles of Accounting I	3
ACT 240 Principles of Accounting II	3
EN 211D Technical and Report Writing [I]	4
MA 104 College Algebra with Applications in the Sciences and Technologies [III]	4
MA 106 Trigonometry [III]	3
MET 211 Mechanics and Statics	4
MGT 240 Organizational Behavior and Management	3
MKT 230 Introduction to Marketing	3
PH 201 College Physics I [III]	5

CIS 110 Principles of Computer Information Systems [V] or IS 100 Introduction to Windows, E-mail and the Internet [V] and three other IS courses [V]	4
SP 100 Public Address	4

Minor, Contracted Minor or General Electives	20
---	-----------

Hospitality Management Major

This program provides graduates with the background to assume supervisory or leadership positions in the hospitality industry. The curriculum includes courses that cover both classroom-based learning and hands-on learning experiences.

Total Credits Required for Degree	124
Liberal Studies	30-40
Health Promotion	2
Required Courses in Major	51
HM 111 Food Service Sanitation	2
HM 112 Introduction to the Hospitality Industry	4
HM 115 Professional Cooking I	4
HM 120 Professional Cooking II	4
HM 210 Supervision in the Hospitality Industry	4
HM 214 Cost Control for the Hospitality Industry	4
HM 221 Hospitality Service Management	4
HM 225 Banquets and Catering	4
HM 226 Purchasing for the Hospitality Industry	2
HM 240 Hotel and Lodging Operations	3
HM 310 Menu Analysis and Design	4
HM 330 Beverage and Bar Management	4
HM 450 Hospitality Operations Plan and Design	4
HM 480 Current Issues in the Hospitality Industry	4
Technical Electives	6
<i>Choose from the following:</i>	
HM 100 Food Preparation and Selection (4 cr.)	
HM 315 Multi-Cultural Foods (4 cr.)	
HM 318 Resort Development (4 cr.)	
HM 401 Internship (1-4 cr.)	
HM 495 Special Topics in Hospitality (4 cr.)	
Other Required Courses	18
ACT 201 Practical Accounting Procedures (or higher)	4
HN 210 Nutrition for Humans	4
MA 100 Intermediate Algebra (or higher)	4
MGT 221 Business Law I: Legal Environment of Business	3
MKT 230 Introduction to Marketing	3

ASSOCIATE DEGREE PROGRAMS

Automotive Service Technology

Associate of Technology

Students in this program gain an overall technical foundation of theory and practical applications in engine repair, automatic transmissions, chassis systems, power trains, vehicle electrical systems, fuel and ignition systems and computer control systems. State certification tests are offered at the end of each semester.

Total Credits Required for Degree	62
Liberal Studies	8
EN 111 College Composition I	4
CIS 110 Principles of Computer Information Systems	4
Health Promotion	1
HP 200 Physical Well Being	1
Technical Concentration	40
PT 162 Steering, Suspension and Alignment	4
PT 163 Vehicle Brake Systems	4
PT 164 Major Engine Repair	4
PT 166 Automotive Power Trains	4
PT 170 Basic Automotive Electricity	4
PT 260 Automatic Transmission Repair	4
PT 262 Automotive Fuel and Emission Control Systems	4
PT 264 Engine Performance and Diagnostics	4
PT 268A Automotive Service Repair <i>or</i>	4
PT 268B Automotive Service Repair Internship	
PT 272 Advanced Automotive Electrical and Electronics	4
Other Required Course	4
MA 100 Intermediate Algebra (or higher)	4
General Electives	9

Aviation Maintenance Technology

Associate of Applied Science

This program prepares students to be aviation maintenance technologists. All training takes place in state-of-the-art facilities and is designed to meet airline industry standards. Students work in the following five lab areas: power plant, airframe, non-destructive testing, composite and sheet metal. Students do engine runups, repair, and restoration of the operational status of the aircraft. Students typically take between 16 and 20 credits for five semesters, receiving their degree after 2 1/2 years of study. Ninety-five percent of graduates from this program are employed in the aviation industry.

Total Credits Required for Degree	89
Liberal Studies	12
EN 111 College Composition I	4
EN 211D Technical and Report Writing	4
CIS 110 Principles of Computer Information Systems	4

Health Promotion	1
HP 200 Physical Well Being	1

Technical Concentration	72
AMT 101 Introduction to Aviation Maintenance	6
AMT 102 Aircraft Basic Science	6
AMT 103 Aviation Shop Practices	6
AMT 104 Aircraft Electrical Systems	6
AMT 200 Aircraft Sheet Metal/Non-Metallic Structures	6
AMT 201 Reciprocating Engines and Propellers	6
AMT 202 Aircraft Assembly and Rigging	6
AMT 203 Reciprocating Engine Overhaul	6
AMT 204 Turbine Engine Theory	6
AMT 205 Hydraulics, Pneumatics and Landing Gear	6
AMT 206 Cabin Atmosphere and Information Systems	6
AMT 207 Turbine Engine Maintenance and Inspection	6

Other Required Course	4
MA 100 Intermediate Algebra	4

Building Technology

Associate of Applied Science

This program is designed to provide the student with a technical foundation with specialization in the areas of project design, building materials, construction systems and related documents.

Total Credits Required for Degree	65
Liberal Studies	21
EN 111 College Composition I	4
EN 211D Technical and Report Writing	4
MA 104 College Algebra with Applications in the Sciences and Technologies	4
PH 201 College Physics I	5
CIS 110 Principles of Computer Information Systems <i>or</i>	4
IS 100 Introduction to Windows, E-mail and the Internet (1 cr.) <i>and</i> three other IS courses	

Health Promotion	1
HP 200 Physical Well Being	1

Technical Concentration	28
CN 107 Construction Documents	3
CN 151 Introduction to Construction	3
CN 154 Construction Surveying and Layout	3
CN 156 Construction Systems and Methods	3
CN 158 Concrete	3
WT 161 Wood Processing I	2
CN 251 Construction Field Operation	2
CN 252 Codes and Inspection	3
CN 278 Mechanical Systems	3
CN 283 Construction Estimating	3

Other Required Courses	7
MA 106 Trigonometry	3
SP 100 Public Address	4

General Electives	8
--------------------------	----------

Climate Control Technology
Associate of Applied Science

Professionals in the heating, ventilation, air condition and refrigeration (HVACR) industry are specialists who create comfortable, healthy and energy-efficient indoor environments for the storage of food and medicine, and for transportation, warehouses, factories and many other essential services. The climate control degree program offers instruction in both technical theory and practical knowledge.

Total Credits Required for Degree	63
<hr/>	
Liberal Studies	12
EN 111 College Composition I	4
EN 211D Technical and Report Writing	4
CIS 110 Principles of Computer Information Systems	4
<hr/>	
Health Promotion	1
HP 200 Physical Well Being	1
<hr/>	
Technical Concentration	40
HV 170 Applied Electricity for Trades	4
HV 171 Basic Heating	4
HV 172 Basic Refrigeration	4
HV 173 Heating Systems I	4
HV 174 ACR Systems I	4
HV 175 Air Delivery Systems	4
HV 270 Heating Systems II	4
HV 271 ACR Systems II	4
HV 273 Comfort Systems Design	4
HV 275 HVACR Technical Problems <i>or</i> HV 291 HVACR Internship	4
<hr/>	
Other Required Courses	4
MA 100 Intermediate Algebra (or higher)	4
<hr/>	
General Electives	6

Food Service Management
Associate of Technology

This program prepares the student for entry-level management positions in the hospitality industry. According to the National Restaurant Association, 40,000 new entry-level managers will be needed in the near future, making this one of the fastest growing career fields.

Total Credits Required for Degree	62
<hr/>	
Liberal Studies	8
EN 111 College Composition I	4
Liberal Studies Elective	4
<hr/>	
Health Promotion	1
HP 200 Physical Well Being	1
<hr/>	
Technical Concentration	32
HM 111 Food Service Sanitation	2
HM 112 Introduction to the Hospitality Industry	4
HM 115 Professional Cooking I	4

HM 120 Professional Cooking II	4
HM 210 Supervision in the Hospitality Industry	4
HM 214 Cost Control for the Hospitality Industry	4
HM 221 Hospitality Service Management	4
HM 225 Banquets and Catering	4
HM 226 Purchasing for the Hospitality Industry	2
<hr/>	
Other Required Courses	12
ACT 201 Practical Accounting Procedures (or higher)	4
HN 210 Nutrition for Humans	4
MA 100 Intermediate Algebra (or higher)	4
<hr/>	
General Electives	9

Industrial Maintenance Technology
Associate of Applied Science

Industrial maintenance technicians install, maintain and repair all types of machinery used in an endless array of modern power transmission applications. Mines, paper mills, hospitals and manufacturing companies of all sorts require the services of skilled industrial maintenance technicians to keep their operations running smoothly. Industrial maintenance technicians are often employed in machine repair departments or may be referred to as millwrights.

Total Credits Required for Degree	63
<hr/>	
Liberal Studies	8
EN 111 College Composition I	4
EN 211D Technical and Report Writing	4
<hr/>	
Health Promotion	1
HP 200 Physical Well Being	1
<hr/>	
Technical Concentration	30
HV 170 Applied Electricity for Trades <i>or</i> ET 100 Fundamentals of Electricity (2 cr.) <i>and</i> ET 101 Principles of Electrical Wiring (2 cr.)	4
IM 110 Industrial Measurement and Fabrication	2
IM 214 Alignment, Power Transmissions and Conveyors	4
IM 220 Pumps, Piping and Valves	4
IT 180 Introduction to Fluid Power	3
IT 215 General Industrial Safety	2
IT 265 Total Productive Maintenance	1
WD 140 Introduction to Welding	4
WD 147 Construction Rig and Equipment Installation	2
WD 243 Advanced Arc Welding	3
WD 244 Welding Inspection and Assessment	1
<hr/>	
Other Requirements	8
MA 100 Intermediate Algebra (or higher)	4
CIS/IS Electives	4

Technical Electives

Choose from the following:

- CN 154 Construction Survey and Layout (3 cr.)
- CN 156 Construction Systems and Methods (3 cr.)
- HV 175 Air Delivery Systems (4 cr.)
- MET 213 Materials Science I (3 cr.)
- MF 134 Manufacturing Processes (4 cr.)
- PT 160 Basic Automotive Repair (4 cr.)

General Electives **10**

Mining Option

Students considering future employment with Michigan Mining Company-Cliffs Incorporated should make the following course selections in their program: MA 104 College Algebra with Applications in the Sciences and Technologies, in place of MA 100 Intermediate Algebra, PH 201 College Physics I as a general elective and MET 213 Material Science I as a technical elective.

CERTIFICATE PROGRAMS

Automotive Service Certificate

This program develops quality repair and service technicians for the transportation industries. The automotive service certificate prepares students for positions in automotive servicing, parts sales, and service.

Total Credits Required for Certificate **41**

Health Promotion **1**
 HP 200 Physical Well Being **1**

Technical Concentration **40**
 PT 162 Steering, Suspension and Alignment **4**
 PT 163 Vehicle Brake Systems **4**
 PT 164 Major Engine Repair **4**
 PT 166 Automotive Power Trains **4**
 PT 170 Basic Automotive Electricity **4**
 PT 260 Automatic Transmission Repair **4**
 PT 262 Automotive Fuel and Emission Control Systems **4**
 PT 264 Engine Performance and Diagnostics **4**
 PT 268A Automotive Service Repair *or* **4**
 PT 268B Automotive Service Repair Internship (4 cr.)
 PT 272 Advanced Automotive Electrical and Electronics **4**

6 Aviation Maintenance Technology Certificate

Students work in five lab areas: power plant, airframe, nondestructive testing, composite and sheet metal. Certificate students attend class for four semesters (two academic years) and receive all of the necessary preparation to take the FAA exam to become an A & P aviation mechanic.

Total Credits Required for Certificate **73**

Health Promotion **1**
 HP 200 Physical Well Being **1**

Technical Concentration **72**
 AMT 101 Introduction to Aviation Maintenance **6**
 AMT 102 Aircraft Basic Science **6**
 AMT 103 Aviation Shop Practices **6**
 AMT 104 Aircraft Electrical **6**
 AMT 200 Aircraft Sheet Metal/Non-Metallic Structures **6**
 AMT 201 Reciprocating Engine and Propellers **6**
 AMT 202 Aircraft Assembly and Rigging **6**
 AMT 203 Reciprocating Engine Overhaul **6**
 AMT 204 Turbine Engine Theory **6**
 AMT 205 Hydraulics, Pneumatics and Landing Gear **6**
 AMT 206 Cabin Atmosphere and Information Systems **6**
 AMT 207 Turbine Engine Maintenance and Inspection **6**

Carpentry Certificate

The carpentry certificate is temporarily suspended. New students will not be accepted into the program during the 2006-2007 academic year.

Cosmetology Certificate

This program combines the theory and practical application needed to prepare graduates for entry-level positions in the cosmetology profession. Scientific principles are applied through grooming of patrons. Cosmetologists perform such services as shaping and tinting eyebrows and lashes, applying makeup, permanent waving, coloring and straightening hair, manicuring and giving scalp and facial treatments. Graduates may find employment in independent shops and salons, in hair styling departments of large firms and hotels, or with manufacturers of cosmetic or hair products. Some graduates open their own shops.

Total Credits Required for Certificate **65**

Health Promotion **1**
 HP 200 Physical Well Being **1**

Technical Concentration **64**
 COS 111 Fundamentals of Cosmetology I **4**
 COS 112 Fundamentals of Cosmetology II **4**
 COS 113 Fundamental Application of Physical Services **8**
 COS 121 Intermediate Cosmetology I **4**
 COS 122 Intermediate Cosmetology II **4**
 COS 123 Intermediate Application of Physical Services **8**

COS 131 Advanced Cosmetology I	4
COS 132 Advanced Cosmetology II	4
COS 133 Advanced Application of Physical Services	8
COS 141 Master Level of Cosmetology I	4
COS 142 Master Level of Cosmetology II	4
COS 143 Master Level Application of Physical Services	8

Heating, Ventilation, Air Conditioning and Refrigeration Certificate

This program teaches students to master the skills needed to install, troubleshoot, and repair heating, ventilating, air conditioning and refrigeration (HVACR) systems.

Total Credits Required for Certificate	45
<hr/>	
Health Promotion	1
HP 200 Physical Well Being	1
<hr/>	
Technical Concentration	36
HV 170 Applied Electricity for Trades	4
HV 171 Basic Heating	4
HV 172 Basic Refrigeration	4
HV 173 Heating Systems I	4
HV 174 ACR Systems I	4
HV 175 Air Delivery Systems	4
HV 270 Heating Systems II	4
HV 271 ACR Systems II	4
HV 275 HVACR Technical Problems <i>or</i>	4
HV 291 HVACR Internship	
<hr/>	
Other Required Courses	4
EN 090 Basic Composition (or higher)	4
<hr/>	
General Electives	4

MINOR PROGRAMS

Automotive Service Technology Minor

Total Credits Required for Minor	24
PT 162 Steering Suspension and Alignment	4
PT 164 Major Engine Repair	4
PT 166 Auto Power Train	4
PT 170 Basic Automotive Electricity	4
PT 262 Auto Fuel and Emission Control Systems	4
PT 264 Engine Performance and Diagnostics	4

Construction Systems Minor

Total Credits Required for Minor	20
CN 107 Construction Documents	3
CN 154 Construction Surveying and Layout	3
CN 156 Construction Systems and Methods	3
CN 158 Concrete	3
CN 251 Construction Field Operations	2
CN 252 Codes and Inspections	3
CN 283 Construction Estimating	3

Hospitality Service Management Minor

Total Credits Required for Minor	20
HM 112 Introduction to the Hospitality Industry	4
HM 111 Food Service Sanitation	2
HM 226 Purchasing for the Hospitality Industry	2
HM 214 Cost Control for the Hospitality Industry	4
HM 240 Hotel and Lodging Operations	3
Hospitality Management Electives 300 or above	5

HVACR Minor

Total Credits Required for Minor	20
HV 170 Applied Electricity for Trades	4
HV 171 Basic Heating	4
HV 172 Basic Refrigeration	4
HV 175 Air Delivery Systems	4
HV 273 Comfort Systems Design	4

Industrial Maintenance Minor

Total Credits Required for Minor	20
IM 110 Industrial Measurement and Fabrication	2
IM 214 Alignment, Power Transmission and Conveyors	4
IM 220 Pumps, Piping and Valves	4
WD 140 Introduction to Welding	4
WD 147 Construction Rigging and Equipment Installation	2
WD 243 Advanced Arc Welding	3
WD 244 Welding Inspection and Assessment	1

DIPLOMA PROGRAMS

Advanced Law Enforcement Diploma

This program is intended for certified law enforcement officers. The curriculum includes course work and hands-on experiences to enhance the officers' training. In-service training is offered through the Public Safety Institute, Northern Michigan University.

Total Credits Required for Diploma	16
<hr/>	
Technical Concentration	16

The advanced law enforcement diploma may be earned through the satisfactory completion of any 16 credit hours of unduplicated PSLE prefix courses. However, PSLE 010 Legal Update Training may be counted for a maximum of two of the 16 required credits hours.

Collision Repair Technology Diploma

This program prepares graduates for employment in the field of collision repair. The curriculum includes coursework and hands-on experiences in the areas of component repair and replacement, along with work in areas of paint-prep and refinishing. Students are exposed to contemporary skills and current industry practices.

Total Credits Required for Diploma	36
<hr/>	
Technical Concentration	24
CRT 011 Fundamentals of Collision Repair	4
CRT 012 Component Analysis and Replacement	4
CRT 021 Intermediate Collision Repair	4
CRT 022 Automotive Paint-prep and Application	4
CRT 031 Advanced Collision Repair	4
CRT 032 Advanced Refinishing	4
Technical Electives	12
<i>Choose any courses from AMT, IM, PT and WD</i>	<i>12</i>

Electrical Line Technician Diploma

This program prepares graduates for employment as line technicians employed by public utilities, electrical transmission contractors and related employers.

Total Credit Required for Diploma	31
<hr/>	
Technical Concentration	31
EL 010 Line Electrician Field Practicum I	6
EL 011 Fundamentals of Electricity	2
EL 012 Introduction to Line Electrician Safety	2
EL 013 Electrical Formulas	4
EL 014 Computer Skills for Electrical Trades	2
EL 020 Line Electrician Field Practicum II	6
EL 021 Applied Electricity for Linepersons	3
EL 022 Advanced Line Electrician Safety	2
EL 023 Line Electrician Career Seminar	2
EL 024 Construction Standards for Line Electricians	2

Local Corrections Diploma

This program is intended for persons employed as local corrections officers. The curriculum includes course work and hands-on experiences to update the officers in the required areas of the corrections field. In-service training is offered through the Public Safety Institute, Northern Michigan University.

Total Credits Required for Diploma	16
<hr/>	
Technical Concentration	16
<i>The local corrections diploma may be earned through the satisfactory completion of any 16 credit hours of unduplicated PSCR prefix courses. However, PSCR 011 Legal Update Training may be counted for a maximum of two of the 16 required credits hours.</i>	

CERTIFICATION PROGRAMS

Cosmetology Instructor Certification

This program trains the professional in Michigan law, teaching techniques, record keeping, and administration of a school of cosmetology.

Total Credits Required for Certification	18
<hr/>	
Technical Concentration	18
HR 060 Theory of Cosmetology Fundamentals	4
HR 061 Theory of Cosmetology Supervision	4
HR 062 Theory of Cosmetology Administration	2
HR 063 Practice of Cosmetology Fundamentals	4
HR 064 Practice of Cosmetology Supervision	4