



**MSSC/FLDOE Frameworks/ ET Degree Technical Core Course Outcomes Alignment**

These suggestions are the result of two ET Forum workshops addressing consistency in curriculum course outcomes which also meet MSSC assessment goals for Engineering Technology core courses aligned with MSSC Standards and FLDOE Frameworks AAS/AS CIP Numbers: Engineering Technology (AAS - 0615.000001) (AS-1615.000001).

To better align the Engineering Technology (ET) core courses and Florida Department of Education (FLDOE) curriculum frameworks with the national Manufacturing Skills Standards Council (MSSC) Certified Production Technician (CPT) certification, college partners have agreed to implement common student outcomes for MSSC aligned ET core courses. This document contains agreed upon student outcomes for these courses along with references to aligned FLDOE and MSSC standards for each associated course outcome.

MSSC TEST	ET Core Course Topic Required/ Recommended before taking MSSC test
Safety	Industrial Safety
MSSC Quality Practices & Measurement	(1) Quality (2) Measurement
Manufacturing Processes & Production	(1) Safety, (2) Quality and (3) Manufacturing Processes
Maintenance Awareness	(1) Safety, (2) Quality and (3) Manufacturing Processes

**ET Core Courses Used Throughout Florida for MSSC Alignment**

**Bold denotes most frequently used PFX & NUM; Other ET Core courses are listed on page 7**

ET Core Course Topic	ET Courses Offering the Topic (Select One from each Core Area)
Safety	<b>ETI 1701 Industrial Safety</b> ETI 1720C Industrial Safety BCN 2732 OSHA Safety
Quality	<b>ETI 1110 Introduction to Quality/Quality Assurance</b> ETI 1117 Introduction to Quality Control ETI 2110 Introduction to Quality Assurance
Manufacturing Processes	ETI 1411 Manufacturing Processes <b>ETI 1420 Manufacturing Processes &amp; Materials</b> ETI 1420C Manufacturing Processes & Materials ETI 2411 Manufacturing Processes EST 1352 Introduction to Manufacturing Processes ETI 2622 Intro to Lean Manufacturing ETIC 1830 Materials & Processes
Measurement	ETI 1130C Instrumentation ETI 1152 Instrument Techniques and Measurement EST 1520 Basics of Instrumentation ETIC 2851 Applied Mechanics ETM 1010 Mechanical Measurement & Instrumentation <b>ETM 1010C Mechanical Measurement &amp; Instrumentation</b>

## **Safety: Suggested Course Outcomes:**

In this course, students will encounter a comprehensive view of industrial processes and materials properties, employee activities, and facility operations leading to a safe and productive modern manufacturing workplace.

### **1. Identify safety policies and regulations, safety training, personal safety practices, and teamwork skills that enhance workplace safety and safe operator performance in a modern manufacturing environment.**

FLDOE 01.0, 04.0, 08.0, 10.0, 11.0

MSSC WORK 1, 3, 5, 6

MSSC WORKER Safe and Productive Workplace, Personal Safety Practices, Safety Policies and Regulations, Safety Training, Communication Skills that Enhance Safety, Teamwork Skills that Enhance Safety

### **2. Describe methods used to inform and train employees in safety procedures and practices, safe materials handling, responding to workplace hazards and emergencies, industrial hygiene, and environmental safety requirements.**

FLDOE 01.0, 04.0, 08.0, 10.0, 11.0

MSSC WORK 1, 2, 3, 5, 6

MSSC WORKER Safe and Productive Workplace, Safety Procedures, Personal Safety Practices, Safety Policies and Regulations, Safety Training, Communication Skills that Enhance Safety, Teamwork Skills that Enhance Safety

### **3. Describe corrective action for unsafe workplace conditions.**

FLDOE 06.0, 07.0, 08.0, 11.0

MSSC WORK 2, 3, 4, 8, 9

MSSC Worker Safety Procedures, Personal Safety Practices, Safety Policies and Regulations, Safety-related Maintenance Procedures, Safety Training, Training Skills that Enhance Safety

### **4. Describe manufacturing facility safety practices and procedures for safe materials and equipment handling (including electricity, fire, and hazardous materials).**

FLDOE 01.0, 03.0, 04.0, 08.0, 10.0, 11.0

MSSC WORK 1, 2, 4, 7, 8, 9

MSSC Worker Safety Procedures, Personal Safety Practices, Safety Policies and Regulations, Safety-related Maintenance Procedures, Safety Training, Training Skills that Enhance Safety

### **5. Identify tools, instruments, testing devices and how they are used to monitor, troubleshoot, and maintain safe equipment and avoid potential workplace hazards.**

FLDOE 06.0, 07.0, 08.0, 10.0, 11.0

MSSC WORK 1, 2, 4, 8, 9

MSSC Worker Safety Procedures, Personal Safety Practices, Safety Policies and Regulations, Safety-related Maintenance Procedures, Safety Training, Training Skills that Enhance Safety

### **6. Demonstrate use of skills using instruments and testing devices to monitor, maintain and evaluate safe equipment and operator performance.**

FLDOE 01.0, 03.0, 04.0, 06.0, 07.0, 08.0, 10.0, 11.0

MSSC WORK 1, 2, 3, 4, 5, 6, 7, 8, 9

MSSC Worker Safe and Productive Workplace, Safety Procedures, Personal Safety Practices, Safety Policies and Regulations, Safety-related Maintenance Procedures, Safety Training, Communication Skills that Enhance Safety, Teamwork Skills that Enhance Safety, Training Skills that Enhance Safety

### **7. Demonstrate basic troubleshooting skills in high performance, safety-conscious, modern manufacturing workplace scenarios dealing with hazardous materials, fire, and machine operations.**

FLDOE 01.0, 03.0, 04.0, 06.0, 07.0, 08.0, 10.0, 11.0

MSSC WORK 1, 2, 3, 4, 5, 6, 7, 8, 9

MSSC Worker Safe and Productive Workplace, Safety Procedures, Personal Safety Practices, Safety Policies and Regulations, Safety-related Maintenance Procedures, Safety Training, Communication Skills that Enhance Safety, Teamwork Skills that Enhance Safety, Training Skills that Enhance Safety

### **Quality Practices & Measurement: Suggested Course Outcomes:**

In this course, students will encounter the uses of quality assurance methods and quality control concepts and procedures which are standard operating business practices and strategies in a modern manufacturing environment. Test after both Quality and Measurement courses are completed.

#### **1. Identify the methods and documentation used in internal inspections and quality audit procedures.**

FLDOE 5.0, 08.0, 09.0, 10.0, 11.0

MSSC WORK 1, 4, 6, 8

MSSC WORKER Overall Quality Process, Quality Systems and Inspection Tools, Quality Documentation

#### **2. Describe current trends in quality process outcomes.**

FLDOE 5.0, 08.0, 09.0, 10.0, 11.0

MSSC WORK 1, 6, 8

MSSC WORKER Overall quality process, Quality Documentation

#### **3. Suggest corrective actions based on the results of quality tests.**

FLDOE 05.0, 06.0, 07.0, 09.0, 10.0, 11.0

MSSC WORK 5, 6, 7

MSSC WORKER Quality Systems and Inspection Tools, Corrective Action, Quality Documentation, Basic Measurement

#### **4. Apply root cause analysis methodology.**

FLDOE 01.0, 03.0, 04.0, 06.0, 07.0, 08.0, 09.0, 10.0, 11.0

MSSC WORK 2, 4

MSSC WORKER Overall Maintenance Process, Maintenance of Tools and Equipment, Maintenance-related Safety, Potential Maintenance Issues with Basic Production Systems

#### **5. Describe production scheduling principles and practices.**

*This item was moved from Manufacturing Processes to Quality based on faculty feedback at ET Forum workshops.*

FLDOE 01.0, 04.0, 05.0, 07.0, 08.0, 09.0, 10.0, 11.0

MSSC WORK 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

MSSC WORKER Processes and Production, Production Equipment Operations, Production Materials, Tools and Equipment, Work Orders and Documentation

#### **6. Describe preventive maintenance methods and applications.**

FLDOE 01.0, 02.0, 03.0, 04.0, 05.0, 06.0, 07.0, 08.0, 09.0, 10.0, 11.0

MSSC WORK 1, 2, 3, 4

MSSC WORKER Overall Maintenance Process, Maintenance of Tools and Equipment, Documentation of Maintenance, Maintenance-related Safety, Potential Maintenance Issues with Basic Production Systems, Proper Lubrication Procedures, Bearings and Coupling Reliability, Belt and Chain Drive Reliability

*Note: In 2010, FLATE collected data for students enrolled in college courses and taking the MSSC certification tests. For 17 students taking the MSSC Quality Assurance Test at two different colleges, only one passed the MSSC category: Document the results of quality tests, and only two passed the MSSC Category: Fundamentals of blueprint reading. No students in this group passed the MSSC Category: Use common measurement systems and precision measurement tools. Thus, an emphasis in these areas is indicated.*

## **Manufacturing Processes & Production: Suggested Course Outcomes:**

In this course, students will encounter manufacturing processes, production systems and techniques, mechanisms, materials and their properties which are used in a modern manufacturing environment.

### **1. Identify the functions and components of simple/compound machines and conveyor systems.**

FLDOE 01.0, 03.0, 06.0, 10.0, 11.0

MSSC WORK 1, 2, 3

MSSC WORKER Overall Maintenance Process, Maintenance of Tools and Equipment, Potential Maintenance Issues with Basic Production Systems, Proper Lubrication Procedures, Bearing and Couplings Reliability, Belt and Chain Drive Reliability

### **2. Identify appropriate machines, resources, equipment, and mechanisms used in manufacturing.**

FLDOE 01.0, 04.0, 09.0, 10.0, 11.0

MSSC WORK 1, 2, 5, 6

MSSC WORKER Processes and Production, Production Equipment Operations, Production Materials, Tools and Equipment

### **3. Summarize the physical properties and characteristics of engineering materials necessary for efficient manufacture.**

FLDOE 01.0, 04.0, 09.0, 10.0, 11.0

MSSC WORK 1, 2, 5, 6

MSSC WORKER Processes and Production, Production Equipment Operations, Production Materials, Tools and Equipment

### **4. Summarize the mechanical properties and characteristics of engineering materials.**

FLDOE 01.0, 04.0, 09.0, 10.0, 11.0

MSSC WORK 1, 2, 5, 6

MSSC WORKER Processes and Production, Production Equipment Operations, Production Materials, Tools and Equipment

### **5. Select appropriate manufacturing processes, materials, and documentation in production scenarios.**

FLDOE 01.0, 04.0, 05.0, 08.0, 09.0, 10.0, 11.0

MSSC WORK 7, 8, 9, 10

MSSC WORKER Processes and Production, Production Equipment Operations, Production Materials, Tools and Equipment, Work Orders and Documentation

### **6. Interpret industrial prints.**

*Moved from Maintenance Awareness to Manufacturing Processes Fall 2012*

FLDOE 01.0, 02.0, 06.0, 07.0, 11.0

MSSC WORK 1

MSSC WORKER Documentation of Maintenance, Maintenance-related Safety

### **7. Identify types and uses of industrial lubricants.**

FLDOE 01.0, 06.0, 07.0, 11.0

MSSC WORK 1, 2, 3, 4

MSSC WORKER Overall Maintenance Process, Maintenance of Tools and Equipment, Documentation of Maintenance, Maintenance-related Safety, Potential Maintenance Issues with Basic Production Systems, Proper Lubrication Procedures, Bearings and Coupling Reliability, Belt and Chain Drive Reliability

### **8. Identify proper functioning of bearings, couplings, belts, and chain drives.**

FLDOE 01.0, 06.0, 07.0, 11.0

MSSC WORK 1, 2, 3, 4

MSSC WORKER Overall Maintenance Process, Maintenance of Tools and Equipment, Documentation of Maintenance, Maintenance-related Safety, Potential Maintenance Issues with Basic Production Systems, Proper Lubrication Procedures, Bearings and Coupling Reliability, Belt and Chain Drive Reliability

**9. Identify types and uses of lubricants.**

*Moved from Maintenance Awareness to Manufacturing Processes Fall 2012*

FLDOE 01.0, 06.0, 07.0, 11.0

MSSC WORK 1, 2, 3, 4

MSSC WORKER Overall Maintenance Process, Maintenance of Tools and Equipment, Documentation of Maintenance, Maintenance-related Safety, Potential Maintenance Issues with Basic Production Systems, Proper Lubrication Procedures, Bearings and Coupling Reliability, Belt and Chain Drive Reliability

**10. Identify proper functioning of bearings, couplings, belts, and chain drives**

*Moved from Maintenance Awareness to Manufacturing Processes Fall 2012*

FLDOE 01.0, 06.0, 07.0, 11.0

MSSC WORK 1, 2, 3, 4

MSSC WORKER Overall Maintenance Process, Maintenance of Tools and Equipment, Documentation of Maintenance, Maintenance-related Safety, Potential Maintenance Issues with Basic Production Systems, Proper Lubrication Procedures, Bearings and Coupling Reliability, Belt and Chain Drive Reliability

*Covered in Manufacturing Processes & Materials ETI 1420/Applied Mechanics ETIC 2851*

**11. Describe the housekeeping steps needed to maintain safe, efficient production schedules.**

*Moved from Maintenance Awareness to Manufacturing Processes Fall 2012*

FLDOE 01.0, 04.0, 06.0, 08.0, 09.0, 10.0, 11.0

MSSC WORK 1, 2, 3

MSSC WORKER Overall Maintenance Process, Maintenance of Tools and Equipment, Documentation of Maintenance, Maintenance-related Safety

## **Coverage of MSSC standards for *Maintenance Awareness* in ET Coursework**

As a result of the Sept. 28, 2012 ET Forum MSSC course review workshop, it was determined that Maintenance Awareness concepts and applications are covered in other courses which are included in ET coursework. Example course PFX and NUM where the topics are covered is shown; a full listing of all ET core course NUM, PFX, and title by core course category is provided on page 1.

### ***Use Ohm's Law and Power Law formulas to determine current, voltage, resistance and power.***

*Covered in Introduction to Electronics EET 1084*

FLDOE 03.0, 04.0, 08.0, 10.0, 11.0

MSSC WORK 2, 4

MSSC WORKER Overall Maintenance Process, Maintenance-related Safety, Potential Maintenance Issues with Basic Production Systems

### ***Properly maintain tools and equipment through preventative maintenance and routine repair.***

*Covered in Mechanical Measurement & Instrumentation ETM 1010C/Applied Mechanics ETIC 2851*

FLDOE 01.0, 04.0, 06.0, 08.0, 09.0, 10.0, 11.0

MSSC WORK 1, 2, 3

MSSC WORKER Overall Maintenance Process, Maintenance of Tools and Equipment, Documentation of Maintenance, Maintenance-related Safety

### ***Describe preventative maintenance methods and applications.***

*Covered in Introduction to Quality ETI 1110/Manufacturing Processes ETI 2411*

FLDOE 01.0, 02.0, 03.0, 04.0, 05.0, 06.0, 07.0, 08.0, 09.0, 10.0, 11.0

MSSC WORK 1, 2, 3, 4

MSSC WORKER Overall Maintenance Process, Maintenance of Tools and Equipment, Documentation of Maintenance, Maintenance-related Safety, Potential Maintenance Issues with Basic Production Systems, Proper Lubrication Procedures, Bearings and Coupling Reliability, Belt and Chain Drive Reliability

## Appendix

### Other ET Core Courses

**(Bold denotes most frequently used PFX & NUM)**

Electronics	EET 1083 Electronics Orientation EET 1084 Introduction to Electronics <b>EET 1084C Introduction to Electronics</b> EET 1184 Introduction to Electronics EET 2084C Introduction to Electronics
Computer Aided Drafting	CGS 2470 Computer Aided Drafting & Design EGS 1110 Engineering Graphics EGS 1111 Engineering Graphics <b>ETD 1320 Introduction to CAD</b> ETD 1320C Introduction to AutoCAD ETD 1320C Computer Aided Drafting for Engineering ETDC 2320 AutoCAD Fundamentals ETD 2320C Computer-Aided Drafting

Online course materials for Engineering Technology classes may be found on the Engineering Technology (ET) WIKI: [www.etshare.pbworks.com](http://www.etshare.pbworks.com) Registration is required to access the WIKI; simply visit the site, register and request a log-in from Daytona State College.