OFFICE OF INSTRUCTIONAL ENHANCEMENT AND INTERNAL OPERATIONS
Summary of State Board of Education Agenda Items
November 14-15, 2013

OFFICE OF CAREER AND TECHNICAL EDUCATION

12. Approval to begin the Administrative Procedures Act process: To revise the Mississippi Secondary Curriculum Frameworks in Career and Technical Education and Academic Education

Executive Summary

The following secondary curriculum frameworks are recommended for approval:

1. Agricultural Technology & Mechanical Systems (Core)
2. Agricultural Power & Machinery
3. Automotive Service Technician
4. Engineering
5. Food Products (Meats)
6. Forestry
7. Installation Service (Core)
8. HVAC
9. Industrial Maintenance
10. Information Communication I
11. Information Communication II
12. Information Technology
13. Lodging, Hospitality & Tourism
14. Welding

All curricula frameworks are designed to provide local programs with an instructional foundation that can be used to develop localized instructional management plans and course syllabi. Additionally, the frameworks include the following elements for each revised secondary curricula:

- Program Description
- CIP Code and CIP Name
- Course Outline and Codes
- Curriculum Framework
  - Student Competencies
  - Suggested Student Objectives

Draft curricula for each program were revised and reviewed with input from local district personnel and business/industry collaborators. Approved secondary curricula will be disseminated for implementation in the fall 2014.

Note: The Office of Career and Technical Education has provided printed, bound executive summaries of the curriculum frameworks. The detailed documents are available upon request.

Recommendation: Approval

Back-up material attached

2007 Mississippi Curriculum Framework

Secondary Agriculture Power and Machinery

(Program CIP: 01.0204 – Agricultural Power Machinery Operation)

Direct inquiries to

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Published by

Office of Vocational Education and Workforce Development
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Research and Curriculum Unit for Workforce Development
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Acknowledgments

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MDE Staff	Wilbur Chancellor – Agriculture and Related Technology Program Coordinator
Professional Curriculum Advisory Team	Mr. Danny Briscoe Mr. Robert Holley Mr. Don Brewer Mr. Joe Galey Mr. Jeremy Massey Mr. Shane Lawrence Mr. Allen Spence

Standards in this document are based on information from the following organizations:

Agriculture, Food, and Natural Resources Standards	Industry standards referenced are from the *Career Cluster Resources for Agriculture, Food, and Natural Resources* as published by the National Association. The complete text of this document can be found at http://www.careerclusters.org/ClusterDocuments/agdocuments/AGFinal.pdf.
Academic Standards	Mississippi Department of Education Subject Area Testing Program
21st Century Skills	Reproduced with permission of the Partnership for 21st Century Skills. Further information may be found at www.21stcenturyskills.org

Preface

Secondary Agriculture Power and Machinery Research Synopsis

Articles, books, Web sites, and other materials listed at the end of each instructional unit were considered during the revision process. These references are suggested for use by instructors and students during the study of the topics outlined.

Industry advisory team members from other secondary and postsecondary agricultural power and machinery programs throughout the state were asked to give input related to changes to be made to the curriculum framework. Instructors from secondary and postsecondary agriculture power and machinery programs throughout the state were also asked to give input on changes to be made to the curriculum framework.

Curriculum

The following state/national standards were referenced in each course of the curriculum:

- *Mississippi Department of Education Subject Area Testing Program Academic Standards*
- *21st Century Skills*
- *Career Cluster Resources for Agriculture, Food, and Natural Resources* as published by the National Association of State Directors of Career and Technical Education

Industry and instructor comments, along with current research, were considered by the curriculum revision team during the revision process; and changes were made as needed and appropriate. Many of the skills and topics noted in the research were already included in the curriculum framework. Specific changes made to the curriculum at the curriculum revision meeting included:

- Competencies and objectives were reviewed to ensure accuracy and appropriateness and that they were aligned to the Career Clusters skills and knowledge statements.
- Information from the "Special Topics" units in both courses was integrated into other units and the "Special Topics" units were removed from the curriculum.
- Competencies on Supervised Agricultural Experience programs and recordkeeping were added to the Introduction units in both courses.
- All Suggested Strategies were updated to reflect differentiated instruction and other proven instructional practices.
- Rubrics and other suggested assessment instruments were added.
- The Recommended Tools and Equipment list was updated.

Assessment

Students will be assessed using the Mississippi Career Planning and Assessment test for *Secondary Agriculture Power and Machinery MS-CPAS2 Test*.

Professional Learning

It is suggested that instructors participate in professional learning related to the following concepts:

- Integrating academics into Agriculture Power and Machinery
- Use of the Mississippi Agriculture Education BRIDGE site on Blackboard®

- ~~Use of precision agriculture technology~~
- ~~Implementation of Supervised Agricultural Experience programs for Agricultural Power and Machinery~~
- ~~Differentiated instruction – To learn more about differentiated instruction, please go to http://www.paec.org/teacher2teacher/additional_subjects.html and click on Differentiated Instruction. Work through this online course and review the additional resources.~~

Foreword

Secondary vocational-technical education programs in Mississippi are faced with many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Career and Technical Education Improvement Act of 2006; and No Child Left Behind Act of 2001).

Each secondary vocational-technical course consists of a series of instructional units which focus on a common theme. All units have been written using a common format which includes the following components:

- Unit Number and Title
- Suggested Time on Task - An estimated number of clock hours of instruction that should be required to teach the competencies and objectives of the unit. A minimum of 140 hours of instruction is required for each Carnegie unit credit. The curriculum framework should account for approximately 75-80 percent of the time in the course.
- Competencies and Suggested Objectives
  - A competency represents a general concept or performance that students are expected to master as a requirement for satisfactorily completing a unit. Students will be expected to receive instruction on all competencies.
  - The suggested objectives represent the enabling and supporting knowledge and performances that will indicate mastery of the competency at the course level.
- Suggested Teaching Strategies - This section of each unit indicates strategies that can be used to enable students to master each competency. Emphasis has been placed on strategies which reflect active learning methodologies. Teachers should feel free to modify or enhance these suggestions based on needs of their students and resources available in order to provide optimum learning experiences for their students.
- Suggested Assessment Strategies - This section indicates strategies that can be used to measure student mastery. Examples of suggested strategies could include rubrics, class participation, reflection, and journaling. Again, teachers should feel free to modify or enhance these suggested assessment strategies based on local needs and resources.

- ~~Integrated Academic Topics, Workplace Skills, Technology Standards, and Occupational Standards - This section identifies related academic topics as required in the Subject Area Assessment Program (SATP) in Algebra I, Biology I, English II, and U. S. History from 1877, which are integrated into the content of the unit. It also identifies the 21st Century Skills, which were developed by the Partnership for 21st Century Skills, a group of business and education organizations concerned about the gap between the knowledge and skills learned in school and those needed in communities and the workplace. A portion of the 21st Century Skills addresses learning skills needed in the 21st century, including information and communication skills, thinking and problem-solving skills, and interpersonal and self-directional skills. The need for these types of skills has been recognized for some time and the 21st Century Skills are adapted in part from the 1991 report from the U.S. Secretary of Labor's Commission on Achieving Necessary Skills (SCANS). Another important aspect of learning and working in the 21st century involves technology skills, and the International Society for Technology in Education, developers of the National Educational Technology Standards (NETS), were strategic partners in the Partnership for 21st Century Skills.~~
- ~~References - A list of suggested references is provided for each unit. The list includes some of the primary instructional resources that may be used to teach the competencies and suggested objectives. Again, these resources are suggested and the list may be modified or enhanced based on needs and abilities of students and on available resources.~~

~~Table of Contents~~

Program Description

Agriculture Power and Machinery is an instructional program designed to provide basic skills for students to become employed in the industry of agricultural power mechanics or to continue their education in postsecondary institutions. Skills taught in the program relate to selection, operation, service, maintenance, and repair of a variety of agricultural power units and agricultural machinery and equipment. The program includes instruction in gasoline and diesel engines, welding, hydraulics, and other power systems. This program makes use of the FFA Leadership, Professional Development Activities, and Supervised Agricultural Experience Program as integral learning laboratories.

General equipment maintenance and operation are covered in this course. Specific equipment, such as tillage, turf/lawn care, irrigation, harvesting, and forage equipment, is covered in the postsecondary course.

Industry standards referenced are from the *Career Cluster Resources for Agriculture, Food, and Natural Resources* as published by the National Association. The complete text of this document can be found at http://www.careerclusters.org/ClusterDocuments/agdocuments/AGFinal.pdf.

Course Outline

Agriculture Power and Equipment I

Course CIP Code: 01.0201

Course Description: Agriculture Power and Equipment I is the entry-level course of the secondary Agriculture Power and Machinery program. Students in this course will gain basic skills and knowledge related to safety, measurement, fasteners, welding and cutting, mechanics, equipment maintenance, and agricultural equipment. (2-2½ Carnegie units, depending upon time spent in the course)

Unit	Title	Hours
1	Introduction	10
2	Safety	15
3	Measurement	20
4	Fasteners	10
5	Oxyfuel Cutting	15
6	Arc Welding (SMAW)	28
7	Mechanics and Power Transmission	20
8	Compact Engines Service and Repair	45
9	Equipment/Systems Maintenance	22
10	Repairing and Refinishing Agricultural Equipment	25

Agriculture Power and Equipment II

Course CIP Code: 01.0290

Course Description: Agriculture Power and Equipment II is the completion level course of the secondary Agriculture Power and Machinery program. Students in this course will gain additional skills related to safety, advanced welding and cutting, diesel engines, equipment operation and maintenance, and advanced topics in agriculture. (2-2½ Carnegie units, depending upon time spent in this course)

Unit	Title	Hours
1	Orientation and Safety (Review and Reinforcement)	20
2	Advanced Cutting and Welding	40
3	Hydraulic Systems	20
4	Diesel Engines	40
5	Electrical/Electronics Systems	30
6	Agricultural Equipment Operation	20
7	Periodic and Seasonal Maintenance	10
8	Applying Principles of Diagnostics	15
9	Advanced Technology in Agriculture	15

2014 Agricultural Technology and Mechanical Systems (Core)

Mississippi Department of Education

Program CIP: 01.0205 – Agricultural Mechanics and Equipment/Machine Technology Operation

Direct inquiries to

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Published by

Office of Career and Technical Education
Mississippi Department of Education
Jackson, MS 39205

Research and Curriculum Unit
Mississippi State University
Mississippi State, MS 39762

Betsey Smith, Curriculum Manager
Scott Kolle, Project Manager
Jolanda Harris, Educational Technologist

The Research and Curriculum Unit (RCU), located in Starkville, MS, as part of Mississippi State University, was established to foster educational enhancements and innovations. In keeping with the land grant mission of Mississippi State University, the RCU is dedicated to improving the quality of life for Mississippians. The RCU enhances the intellectual and professional development of Mississippi students and educators while applying knowledge and educational research to the lives of the people of the state. The RCU works within the contexts of curriculum development and revision, research, assessment, professional development, and industrial training.

Preface

Secondary career and technical education programs in Mississippi face many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act IV, 2007; and No Child Left Behind Act of 2001).

Pathway Description

Agriculture Technology and Mechanical Systems Core is an instructional program designed to provide basic skills for students to become employed in the industry of agricultural power mechanics or to continue their education in postsecondary institutions. Skills taught in this pathway relate to the selection, operation, service, maintenance, and repair of a variety of agricultural power units and agricultural machinery and equipment. Students in the pathway will participate in active learning exercises including integral activities of the FFA organization and supervised experiences.

Industry Certification

No national industry-recognized certifications exist at this time. Competencies and suggested performance indicators in the ATMS course have been correlated, however, to the National Agriculture, Food, and Natural Resources (AFNR) Career Cluster Content Standards that have been reviewed and endorsed at the national level by the National Council on Agricultural Education.

Assessment

The latest assessment blueprint for the curriculum can be found at http://www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

If there are questions regarding assessment of this program, please contact the Research and Curriculum Unit at 662.325.2510.

Student Prerequisites

In order for students to be able to experience success in the ATMS program, the following student prerequisites are suggested:

1. C or higher in English (the previous year)
2. C or higher in Math (last course taken or the instructor can specify the math)
3. Instructor Approval and TABE Reading Score (eighth grade or higher)

or

1. TABE Reading Score (eighth grade or higher)
2. Instructor Approval

or

1. Instructor Approval

Teacher Licensure

The latest teacher licensure information can be found *at* http://www.mde.k12.ms.us/educator-licensure.

Professional Learning

If you have specific questions about the content of each training session provided, please contact the Research and Curriculum Unit at 662.325.2510, and ask for the Professional Learning Specialist.

Curriculum Framework Sequence

To complete the pathway students must complete 4 Carnegie Credits.

CORE - 2 Carnegie Credits:

Agriculture Technology and Mechanical Systems (Core)

Subsequent Local Specialization - 2 Carnegie credits:

Agriculture Power and Machinery

Or

Agriculture Small Engine Maintenance (under construction)

Should additional options be developed they will be located on the RCU download page.
www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Option 1—Two, One-Carnegie-Unit Courses

This curriculum consists of two one-credit courses, which should be completed in the following sequence:

1. **Introduction to Agriculture Technology and Mechanical Systems—Course Code: 991302**
2. **Basic Equipment Systems, Maintenance, and Repair—Course Code: 991303**

Course Description: Introduction to Agriculture Technology and Mechanical Systems

This course focuses on introducing students to safety, measurements, fasteners, and basic cutting and welding skills. Students will leave the class with a firm foundation of knowledge in the areas of employability skills, safety, and basic tool knowledge. Additionally, students will learn about the FFA and SAE.

Course Description: Basic Equipment Systems, Maintenance and Repair

This course introduces students to basic equipment systems. Students will learn skills related to maintenance and repair of these systems.

Introduction to Agricultural Technology and Mechanical Systems —Course Code: 991302

Unit	Unit Name	Hours
1	Introduction	10
2	Safety	15
3	Measurement	15
4	Fasteners	10
5	Oxyfuel Cutting	25
6	Arc Welding (SMAW)	40
Total		115

Basic Equipment Systems, Maintenance and Repair —Course Code: 991303

Unit	Unit Name	Hours
7	Mechanics and Power Transmission	15
8	Compact Engines Service and Repair	50
9	Equipment/Systems Maintenance	30
Total		95

Option 2—One Two-Carnegie-Unit Courses

This curriculum consists of the following one, two-Carnegie-unit course:

Agriculture Technology and Mechanical Systems (Course Code: 991300)

Course Description: Agriculture Technology and Mechanical Systems

This course focuses on introducing students to safety, measurements, fasteners, and basic cutting and welding skills. Students will leave the class with a firm foundation of knowledge in the areas of employability skills, safety, and basic tool knowledge. Students will learn about the FFA and SAE. Additionally, this course introduces students to basic equipment systems, maintenance, and repair.

Agriculture Technology and Mechanical Systems (Course Code: 991300)

Unit	Unit Name	Hours
1	Introduction	10
2	Safety	15
3	Measurement	15
4	Fasteners	10
5	Oxyfuel Cutting	25
6	Arc Welding (SMAW)	40
7	Mechanics and Power Transmission	15

8	Compact Engines Service and Repair	50
9	Equipment/Systems Maintenance	30
Total		210

2014 Agricultural Power and Machinery

Mississippi Department of Education

Program CIP: 01.0204 – Agricultural Power Machinery Operation

Direct inquiries to

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Pathway Description

The Agriculture Power and Machinery pathway is a curriculum that provides an educational option for students who have successfully completed the Agriculture Power and Machinery Core (2 Carnegie credits).

Agriculture Power and Machinery is a pathway designed to provide basic skills for students to become employed in the industry of agricultural power mechanics or to continue their education in postsecondary institutions. Skills taught in this pathway relate to the selection, operation, service, maintenance, and repair of a variety of agricultural power units and agricultural machinery and equipment. This pathway also includes instruction in gasoline and diesel engines, welding, hydraulics, and other power systems. Students in the pathway will participate in active learning exercises including integral activities of the FFA organization and supervised experiences. Students who successfully complete the competencies in this pathway will possess fundamental knowledge and skills that can be used to secure entry-level employment or as a foundation for continuing their education. Industry standards are adapted from the publication Career Cluster Resources for Agriculture, Food, and Natural Resources, developed by the National Association of State Directors of Career and Technical Education.

Industry Certification

No national industry-recognized certifications exist at this time. Competencies and suggested performance indicators in the APM course have been correlated, however, to the National Agriculture, Food, and Natural Resources (AFNR) Career Cluster Content Standards that have been reviewed and endorsed at the national level by the National Council on Agricultural Education.

Assessment

The latest assessment blueprint for the curriculum can be found at

http://www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

If there are questions regarding assessment of this program, please contact the Research and Curriculum Unit at 662.325.2510.

Student Prerequisites

In order for students to be able to experience success in the APM program, the following student prerequisites are in suggested:

1. C or higher in English (the previous year)
2. C or higher in Math (last course taken or the instructor can specify the math)
3. Instructor Approval and TABE Reading Score (eighth grade or higher)

or

1. TABE Reading Score (eighth grade or higher)
2. Instructor Approval

or

1. Instructor Approval

Teacher Licensure

The latest teacher licensure information can be found at

http://www.mde.k12.ms.us/educator-licensure.

Professional Learning

If you have specific questions about the content of each training session provided, please contact the Research and Curriculum Unit at 662.325.2510, and ask for the Professional Learning Specialist.

Option 1—Two One-Carnegie-Unit Courses

This curriculum consists of two one-credit courses, which should be completed in the following sequence:

1. **Agricultural Power and Machinery: Diesel and Hydraulic Systems, and Advanced Cutting—Course Code: 991304**

2. **Agricultural Power and Machinery: Advanced Equipment Systems, Maintenance, and Repair—Course Code: 991305**

Course Description: Agricultural Power and Machinery: Diesel and Hydraulic Systems and Advanced Cutting

This course emphasizes specialized systems such as Diesel engines and hydraulics. Additionally, students will spend more time with cutting and welding covering more advanced techniques.

Course Description: **Agricultural Power and Machinery: Advanced Equipment Systems, Maintenance and Repair**

This course will offer students the opportunity to examine electrical and electronic systems found on modern agricultural equipment. Additionally, students will learn about equipment operation. Students will also discuss advanced technology that has been introduced as well as new and emerging technologies.

Agricultural Power and Machinery: Diesel and Hydraulic Systems and Advanced Cutting—Course Code: 991304

Unit	Unit Name	Hours
1	Orientation and Safety Review	10
2	Advanced Cutting and Welding	50
3	Hydraulic Systems	25
4	Diesel Engines	35
Total		120

Agricultural Power and Machinery: Advanced Equipment Systems, Maintenance and Repair—Course Code: 991305

Unit	Unit Name	Hours
5	Electrical/Electronic Systems	25
6	Agricultural Equipment Maintenance and Operation	50
7	Advanced Technology in Agriculture	15
Total		90

Option 2—One Two-Carnegie-Unit Course

This curriculum consists of one two-credit course as follows:

Agriculture Power and Machinery—Course Code: 991301

Course Description: Agriculture Power and Machinery

This course emphasizes specialized systems such as Diesel engines and hydraulics and more time with cutting and welding covering advanced techniques. This course will also offer students the opportunity to examine electrical and electronic systems found on modern agricultural equipment. Students will learn about equipment operation, advanced technology in agriculture power, and new and emerging technologies.

Agriculture Power and Machinery—Course Code: 991301

Unit	Unit Name	Hours
1	Orientation and Safety Review	10
2	Advanced Cutting and Welding	50
3	Hydraulic Systems	25
4	Diesel Engines	35
5	Electrical/Electronic Systems	25
6	Agricultural Equipment Maintenance and Operation	50
7	Advanced Technology in Agriculture	15
Total		210

Automotive Service Technician

Program CIP: 47.0604 – Transportation

Ordering Information

Research and Curriculum Unit for Workforce Development

Vocational and Technical Education

Attention: Reference Room and Media Center Coordinator

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Louis Randle, Binding Specialist

Kelly Agee, Editor

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Table of Contents

Acknowledgments

The *Automotive Service Technology Curriculum Framework and Supporting Materials* was adopted by the Mississippi Board of Education on May 16, 2008. The following persons were serving on the state board at the time:

Dr. Hank M. Bounds, Executive Secretary

Mr. Claude Hartley, Chair

Mr. William Harold Jones, Vice Chair

Mr. Howell "Hal" N. Gage

Dr. O. Wayne Gann

Ms. Rebecca Harris

Mr. Charles McClelland

Ms. Sondra Parker Caillavet

Ms. Rosetta Richards

Dr. David Sistrunk

Mike Mulvihill, as Interim Associate Superintendent of Education for the Office of Vocational Education and Workforce Development at the Mississippi Department of Education, assembled an oversight committee to provide input throughout the development of the *Automotive Service Technology Curriculum Framework and Supporting Materials.* Members of this task force were as follows:

Dr. Kay Berry, Simpson County School District
Dr. Sam Bounds, Mississippi Association of School Superintendents
Ms. Beverly Brahan, Mississippi Association of Educators
Mr. David Campbell, Mississippi Association of Middle Level Educators
Ms. Tommye Dale Favre, Mississippi Department of Employment Security
Ms. Mary Hardy, Mississippi PTA
Dr. Anna Hurt, Mississippi Association of School Administrators
Mr. Jay Moon, Mississippi Manufacturers Association
Dr. Dean Norman, Center for Advanced Vehicular Systems Extension
Mr. Michael Ray, Western Line School District
Mr. George Schloegal, Hancock Bank
Ms. Charlene Sproles, Mississippi School Counselor Association
Mr. Mike Thomas, North American Coal Corporation
Mr. Pete Walley, Institutions of Higher Learning
Mr. Clarence Ward, Boys and Girls Clubs of the Gulf Coast
Dr. Debra West, State Board for Community and Junior Colleges

A special thanks is extended to the members of the *Automotive Service Technology Curriculum Framework and Supporting Materials* Professional Advisory Team. Members of this team include the following:

Dean Batton, Simpson County Vocational Center
Annie Covington, Coffeeville Public Schools
Linda Davis, Millsaps Vocational Center
Dave Ellison, Hinds Community College
Jimmy Flynt, Empire Trucks
Scott Kolle, Research and Curriculum Unit
Rick McDonald, Mississippi Gulf Coast Community College
Ted Mangum, Jones County Vocational Center
Michael Myrick, Canton Career Center
Tommy Nance, Fowler Buick
Ray Orr, Itawamba Community College
Danny Owen, Tupelo Public Schools
Ben Pratt, Northeast Mississippi Community College
Rick Saucier, Hancock County Vo-Tech Center
Chad Smith, Smith Brothers Collision Repair
Dale Smith, Thomson Machinery
Cravin Turnage, Holly Springs Public Schools
Earl White, Mississippi Department of Education

Also, a special thanks is extended to the teachers who contributed teaching and assessment materials that are included in the framework and supporting materials. Members who contributed are as follows:

Dr. Paul Cuicchi, Starkville School District, Starkville, MS
John McGee, Starkville School District, Starkville, MS
Danny Owen, Tippah County School District, Ripley, MS
Nick Wages, Jackson County School District, Vancleave, MS
James Burrus, Panola County School District, Batesville, MS
Prentiss Fults, Hinds County School District, Raymond, MS
Kevin Hancock, Madison County School District, Madison, MS
Dale Henry, East Mississippi Community College, Mayhew, MS
Antoine Kimble, Oxford High School, Oxford, MS

Appreciation is also expressed to the following staff members at the Mississippi Department of Education who provided guidance and insight throughout the development process:

Sam Davis, Program Coordinator and Division Director, Office of Vocational Education and Workforce Development, Mississippi Department of Education, Jackson, MS
Bill McGrew, Division Director of Instructional Programs and Student Organizations, Office of Vocational Education and Workforce Development, Mississippi Department of Education

Chris Wall, Bureau Director of Instructional Programs and Student Organizations, Office of Vocational Education and Workforce Development, Mississippi Department of Education

Finally, standards in the *Automotive Service Technology Curriculum Framework and Supporting Materials* are based on the following:

Industry Standards

National Automotive Technicians Education Foundation was founded in 1983 as an independent, nonprofit organization with a single mission: To evaluate technician training programs against standards developed by the automotive industry and recommend qualifying programs for certification (accreditation) by ASE, the National Institute for Automotive Service Excellence. For more information, visit http://www.natef.org/. Reprinted with permission.

Academic Standards

Mississippi Department of Education Subject Area Testing Program

ACT College Readiness Standards

The College Readiness Standards are sets of statements intended to help students understand what is expected of them in preparation for the ACT. These standards are integrated into teaching and assessment strategies throughout the curriculum framework.

21st Century Skills and Information and Communication Technologies Literacy Standards

In defining 21st century learning, the Partnership for 21st Century Skills has embraced five content and skill areas that represent the essential knowledge for the 21st century: global awareness; civic engagement; financial, economic, and business literacy; learning skills that encompass problem-solving, critical-thinking, and self-directional skills; and Information and Communication Technology (ICT) literacy. Reprinted with permission.

National Educational Technology Standards for Students

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Preface

Secondary vocational–technical education programs in Mississippi are faced with many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act IV, 2007; and No Child Left Behind Act of 2001).

Automotive Service Executive Summary

Program Description

Automotive Service is a pathway for students in the Transportation career cluster. The following description is from the current Standard Course of Study for Career–Technical Education, Mississippi Department of Education.

Industry Certification

The Automotive Service pathway includes classroom and hands-on experiences that prepare students for employment or continuing education in the auto service industry. This program was written to incorporate the National Institute for Automotive Service Excellence (ASE) learning objectives/content and hours. Any student who successfully completes this program will be eligible to apply to obtain the ASE exams. ASE requires 2 years of employment before certificates are issued. Students receive 1 year of credit for completion of the secondary program. Students who take certifications before the 2 year requirement is met will be granted certifications after they complete 1 year of automotive employment. This is a national certification program recognized throughout the automotive service industry. Each district should implement a maximum student number due to the size of each lab.

Assessment

Students will be assessed using the Automotive Service MS-CPAS2 test. The MS-CPAS2 blueprint can be found at http://info.rcu.msstate.edu/services/curriculum.asp. If there are questions regarding assessment of this program, please contact the Transportation Instructional Design Specialists at the Research and Curriculum Unit at 662.325.2510.

Student Prerequisites

In order for students to be able to experience success in the Automotive Service pathway, the following student prerequisites are in place:

1. C or Higher in English (the previous year)
2. C or Higher in Math (last course taken, or the instructor can specify the math)
3. Instructor Approval

or

3. TABE Reading Score (eighth grade or higher)
4. Instructor Approval

or

1. Instructor Approval

Proposed Applied Academic Credit

Applied Mathematics content from the curriculum was aligned to the 2007 Mississippi Mathematics Framework Revised Academic Benchmarks. It is proposed that upon the completion of this program, students will earn 1/2 Applied Mathematics credit that can be used for graduation requirements.

Applied Physics content from the curriculum was aligned to the 2007 Mississippi Science Framework Revised Academic Benchmarks. It is proposed that upon the completion of this program (option 1 or option 2), students will earn 1/2 Applied Physics credit that can be used for graduation requirements.

The applied academic credit has *not* been approved by the Mississippi Commission on School Accreditation or by the State Board of Education. If there are questions regarding applied academic credit, please contact the Coordinator of Workforce Education at the Research and Curriculum Unit at 662.325.2510.

Licensure Requirements

A 966 educator license is required to teach the Automotive Service pathway courses. The requirements for the 966 licensure endorsement are listed below:

1. Applicant must have earned a 2-year college degree (associate's degree) or higher from an accredited institution of higher education.
2. Applicant must have 2 years of documented automotive service experience.
3. Applicant must enroll immediately in the Vocational Instructor Preparation (VIP) or the Redesign Education Program (REP).
4. Applicant must complete the individualized professional development plan (PDP) requirements of the VIP or REP prior to the expiration date of the 3-year vocational license.
5. Applicant must hold ASE certificates in brakes, electrical/electronics, engine performance, and steering and suspension.
6. Applicant must successfully complete an approved computer literacy certification exam.
7. Applicant must successfully complete a certification for an online learning workshop, module, or course that is approved by the Mississippi Department of Education.
8. The applicant must successfully complete an Automotive Service certification workshop, module, or course that is approved by the Mississippi Department of Education.

Professional Learning

The professional learning itinerary for the middle school or individual pathways can be found at http://rcu.redesign.edu. If you have specific questions about the content of each training session provided, you will need to contact the Research and Curriculum Unit at 662.325.2510 and ask for the Professional Learning Specialist.

Course Outline

This pathway provides options for local school districts to implement based on student needs and scheduling demand. The first option groups units into one-credit courses for a total of four Carnegie units. The second option groups units into two-credit courses. A description of each option is listed next.

Option 1

The Automotive Service pathway emphasizes industry-based content with time being allocated between lecture and lab activities. Safety is an integral part of every course and activity. The content is aligned with National Institute for Automotive Service Excellence (ASE) standards to ensure that programs can be recommended for certification by National Automotive Technicians Educational Foundation (NATEF). There are four courses in this option: Fundamentals I, Brakes, and Introduction to Electrical/Electronic Systems; Advanced Electrical/Electronic Systems; Engine Performance I; and Engine Performance II and Suspension/Steering Systems and Alternative Fuels. Courses should be scheduled so the student completes all courses in 2 years.

Course Description: Automotive Service Fundamentals I, Brakes, and Introduction to Electrical/Electronic Systems course contains an introduction, safety, measurement, and tool/technical references content. It also contains an introduction to brake systems: disc brakes, drum brakes, and antilock brakes. This course also contains an introduction to electrical/electronic systems information and terminology. The Basic Electrical/Electronic Systems course contains electrical/electronic system theory, battery systems, starting systems, and charging systems.

Course Description: Automotive Service Fundamentals II, The Advanced Electrical/Electronic Systems course contains information on lighting systems, concepts of gauges, warning devices, driver information systems, horn system, wiper/washer system, and accessories system diagnostic repair.

Course Description: Automotive Service Fundamentals III, The Engine Performance I courses contain information on safety, employability skills, basic automobile service, general engine components and theory of operation, concepts of computerized engine control systems, and ignition systems.

Course Description: Automotive Service Fundamentals IV, The Engine Performance II and Suspension/Steering Systems and Alternative Fuels courses contain information on fuel, air induction, and exhaust systems; concepts of emission control systems; concepts of engine service; general suspension/steering theory; steering system inspection, diagnosis, and repair; concepts of front, rear, and miscellaneous systems; and wheel/tire alignment concepts, alternative fuels general information for service and maintenance.

Automotive Service Fundamentals I (One Carnegie Unit) – Course Code: 997002

Unit		Title	Hours
1		Fundamentals I, Brakes, and Introduction to Electrical/Electronic Systems	89
2		Basic Electrical/Electronic Systems	51
			130

Note: The hours listed above are based on 140 hours of instruction for one Carnegie unit credit. ASE-certified programs are required to spend the following hours of instruction for the following units:

- Brakes and Electrical/Electronic Systems (135 hours)
- Basic Electrical/Electronic Systems (60 hours)

Automotive Service Fundamentals II (One Carnegie Unit) – Course Code: 997003

Unit		Title	Hours
3		Advanced Electrical/Electronic Systems	140
			140

Note: The hours listed above are based on 140 hours of instruction for one Carnegie unit credit. ASE-certified programs are required to spend the following hours of instruction for the following units:

- Advanced Electrical/Electronic Systems (140 hours)

Automotive Service Fundamentals III (One Carnegie Unit) – Course Code: 997004

Unit		Title	Hours
4		Engine Performance I	140
			140

Note: The hours listed above are based on 140 hours of instruction for one Carnegie unit credit. ASE-certified programs are required to spend the following hours of instruction for the following units:

- Engine Performance I (140 hours)

Automotive Service Fundamentals IV (One Carnegie Unit) – Course Code: 997005

Unit		Title	Hours
5		Engine Performance II	45
6		Suspension/Steering Systems and Alternative Fuels	95
			140

Note: The hours listed above are based on 140 hours of instruction for one Carnegie unit credit. ASE-certified programs are required to spend the following hours of instruction for the following units:

- Engine Performance II (80 hours)
- Steering and Suspension (95 hours)
- Safety will be reinforced and tested at the beginning of each course.

✓ Courses must be taken in order unless the instructor approves. Foundation knowledge in each course must be mastered to move to the next unit.

✓ Students must complete automotive courses with a score of 80/C or higher in classwork to advance to the next level.

- ✓ To effectively assess mastery respective to a course's instructional hours, the pathway blueprint will test units upon completion of their last hour of instruction.

Option 2

This Automotive Service pathway option also emphasizes industry-based content with time being allocated between lecture and lab activities. The content is aligned with National Institute for Automotive Service Excellence (ASE) standards to ensure that programs can be recommended for certification by National Automotive Technicians Educational Foundation (NATEF). The content is divided into two courses. The content of the first course is Introduction, Safety, and Tools/Technical References, along with Basic Automotive Service, Brakes, Introduction to Electrical/Electronic Systems, and Basic Electrical/Electronic Systems. The second course content is Advanced Electrical/Electronic Systems, Steering and Suspension, and Engine Performance content. Safety is an integral part of every course and activity. A student must complete both courses to be a completer and to receive the 1/2 credit for physics and math.

Course Description: Automotive Service Technology I (Course CIP Code: 997000)
The Fundamentals, Brakes, and Introduction to Electrical/Electronic Systems course contains an introduction, safety, measurement, and tool/technical references content. It also contains an introduction to brake systems: disc brakes, drum brakes, and antilock brakes. This course also contains an introduction to electrical/electronic information and terminology. The Basic Electrical/Electronic Systems course contains electrical/electronic system theory, battery systems, starting systems, and charging systems. The Advanced Electrical/Electronic Systems course contains information on lighting systems, concepts of gauges, warning devices, driver information systems, horn system, wiper/washer system, and accessories system diagnostic repair.

Course Description: Automotive Service Technology II (Course CIP Code: 997001)
The Engine Performance I course contains information on safety, employability skills, basic automobile service, general engine components and theory of operation, concepts of computerized engine control systems, and ignition systems. The Engine Performance II and Steering and Suspension course contains information on fuel, air induction, and exhaust systems; concepts of emission control system; concepts of engine service; general suspension/steering theory; steering system inspection, diagnosis, and repair; concepts of front , rear, and miscellaneous systems; and wheel/tire alignment concepts; and alternative fuels general information for service and maintenance.

Automotive Service I (Two Carnegie Units) – Course Code: 997000

Unit		Title	Hours
1		Fundamentals I, Brakes, and Introduction to Electrical/Electronic Systems	89
2		Basic Electrical/Electronic Systems	51
3		Advanced Electrical/Electronic Systems	140
			280

Note: The hours listed above are based on 140 hours of instruction for one Carnegie unit credit. ASE-certified programs are required to spend the following hours of instruction for the following units:

- Brakes and Introduction to Electrical/Electronic Systems (135 hours)
- Basic Electrical/Electronic Systems (60 hours)

- Advanced Electrical/Electronic Systems (140 hours)

Automotive Service II (Two Carnegie Units) - Course Code: 997001

Unit		Title	Hours
4		Engine Performance I	140
5		Engine Performance II	45
6		Steering/Suspension and Alternative Fuels	95
			280

Note: The hours listed above are based on 140 hours of instruction for one Carnegie unit credit. ASE-certified programs are required to spend the following hours of instruction for the following units:

- Engine Performance I (140 hours)
- Engine Performance II (80 hours)
- Steering and Suspension (95 hours)

- ✓ Scheduling and operating more than one course in the same classroom/laboratory with the same teacher is not allowed.
- ✓ Students must complete the first year with a score of 80/C or higher in classwork to advance to the next level.
- ✓ To effectively assess mastery respective to a course's instructional hours, the pathway blueprint will test units upon completion of their last hour of instruction.

2014 Automotive Service Technician

Mississippi Department of Education

Program CIP: 47.0604 – Automobile/Automotive Mechanic Technology/Technician

Direct inquiries to

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The Research and Curriculum Unit (RCU), located in Starkville, MS, as part of Mississippi State University, was established to foster educational enhancements and innovations. In keeping with the land grant mission of Mississippi State University, the RCU is dedicated to improving the quality of life for Mississippians. The RCU enhances intellectual and professional development of Mississippi students and educators while applying knowledge and educational research to the lives of the people of the state. The RCU works within the contexts of curriculum development and revision, research, assessment, professional development, and industrial training.

Preface

Secondary career and technical education programs in Mississippi face many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act IV, 2007; and No Child Left Behind Act of 2001).

Pathway Description

Automotive Service Technician is a pathway for students in the Transportation career cluster. The following description is from the current Career–Technical Education career cluster website: http://www.careertech.org/career-clusters/resources/clusters/transporation.html

"Careers in the Facility and Mobile Equipment Maintenance pathway include the maintenance, repair, and servicing of vehicles and transportation facilities, as well as the refueling of mobile equipment. All transportation relies on equipment which must function as designed, whenever needed. The people in this pathway keep the equipment and machinery running while looking for more efficient, safe, and cost-effective ways to do so."

Industry Certification

The Automotive Service Technician pathway includes classroom and hands-on experiences that prepare students for continuing education or employment in the auto service industry. This program was written to incorporate the National Institute for Automotive Service Excellence (ASE) learning objectives/content and hours. Students who complete this program are encouraged to take the Maintenance and Light Repair (MLR) ASE exams. The MLR is a national certification program recognized throughout the automotive service industry. It is recommended that a district should implement a maximum student number due to the size of each lab with no more than 20 per instructor.

Assessment

The latest assessment blueprint for the curriculum can be found at http://www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Student Prerequisites

In order for students to be able to experience success in the Automotive Service Technician program, the following student prerequisites are suggested:

1. C or higher in English (the previous year)
2. C or higher in Math (last course taken or the instructor can specify the math)
3. Instructor Approval and TABE Reading Score (eighth grade or higher)

or

1. TABE Reading Score (eighth grade or higher)
2. Instructor Approval

or

1. Instructor Approval

Proposed Applied Academic Credit

None

Teacher Licensure

The latest teacher licensure information can be found at

http://www.mde.k12.ms.us/educator-licensure

Professional Learning

If you have specific questions about the content of any of training sessions provided, please contact the Research and Curriculum Unit at 662.325.2510 and ask for a professional-learning specialist.

Option 1—Four One-Carnegie-Unit Courses

This curriculum consists of four one-credit courses, which should be completed in the following sequence:

1. **Automotive Service Fundamentals I—Course Code: 997002**
2. **Automotive Service Fundamentals II—Course Code: 997003**
3. **Automotive Service Fundamentals III—Course Code: 997004**
4. **Automotive Service Fundamentals IV—Course Code: 997005**

Course Description: Automotive Service Fundamentals I

The Automotive Service Fundamentals I course contains an introduction to shop operations, safety, tools and equipment, and preparing the vehicle for both service and the customer. The engine repair unit focuses on the overall internal combustion engine, cylinder and valve train, and lubrication and cooling systems.

Course Description: Automotive Service Fundamentals II

The Automotive Service Fundamentals II course is an introduction to both automatic and manual drive train and axles. This course also contains an introduction to electrical/electronic information and terminology including electrical/electronic system theory, battery systems, starting systems, and charging systems. It also contains an introduction to disc brakes, drum brakes, and anti-lock brakes.

Course Description: Automotive Service Fundamentals III

The Automotive Service Fundamentals III course contains a review on shop operations, safety, tools and equipment, and preparing the vehicle for both service and the customer. The Advanced Electrical/Electronic Systems unit contains information on lighting systems, concepts of gauges,

warning devices, driver information systems, horn system, wiper/washer system, and accessories system diagnostic repair. The Engine Performance unit contains information on fuel, air induction, and exhaust systems; concepts of emission control system; concepts of engine service.

Course Description: Automotive Service Fundamentals IV

The Automotive Service Fundamentals IV course contains general suspension/steering theory; steering system inspection, diagnosis, and repair; concepts of front, rear, and miscellaneous systems; and wheel/tire alignment concepts. It also includes information for the service and maintenance to the heating, ventilation, and engine cooling system.

Automotive Service Fundamentals I—Course Code: 997002

Unit		Title	Hours
1		Automotive Shop Operations	40
2		Engine Repair	60
3		Manual and Automotive Transmission	40
			140

Automotive Service Fundamentals II—-Course Code: 997003

Unit		Title	Hours
4		Basic Electrical/Electronic Systems	70
5		Automotive Brakes	70
			140

Automotive Service Fundamentals III—Course Code: 997004

Unit		Title	Hours
6		Automotive Shop Operations Review	25
7		Advanced Electrical/Electronic Systems	75
8		Engine Performance	40
			140

Automotive Service Fundamentals IV—Course Code: 997005

Unit		Title	Hours
9		Advanced Engine Performance	40
10		Suspension/Steering Systems	50
11		Automotive Heating and Air	50
			140

- ✓ Courses must be taken in order unless the instructor approves. Foundation knowledge in each course must be mastered to move to the next unit.
- ✓ Students must complete automotive courses with a score of 80/C or higher in classwork to advance to the next level.
- ✓ To effectively assess mastery respective to a course's instructional hours, the pathway blueprint will test units upon completion of their last hour of instruction.

Option 2—Two Two-Carnegie-Unit Courses

This curriculum consists of two two-credit courses, which should be completed in the following sequence:

1. **Automotive Service Technology I—Course Code: 997000**
2. **Automotive Service Technology II— Course Code: 997001**

Course Description: Automotive Service Technology I

The Automotive Service Technology I course contains an introduction to shop operations, safety, tools and equipment, and preparing the vehicle for both service and the customer. The engine repair course focuses on the overall internal combustion engine, cylinder and valve train, and lubrication and cooling systems. The transmission course is an introduction to both automatic and manual drive train and axles. This course also contains an introduction to electrical/electronic information and terminology. The Basic Electrical/Electronic Systems course contains electrical/electronic system theory, battery systems, starting systems, and charging systems. It also contains an introduction to disc brakes, drum brakes, and antilock brakes.

Course Description: Automotive Service Technology II

The Engine Performance I course contains a review on shop operations, safety, tools and equipment, and preparing the vehicle for both service and the customer. The Advanced Electrical/Electronic Systems course contains information on lighting systems, concepts of

gauges, warning devices, driver information systems, horn system, wiper/washer system, and accessories system diagnostic repair. The Engine Performance and Steering and Suspension course contains information on fuel, air induction, and exhaust systems; concepts of emission control system; concepts of engine service; general suspension/steering theory; steering system inspection, diagnosis, and repair; concepts of front, rear, and miscellaneous systems; and wheel/tire alignment concepts. The Automotive Heating and Air information is for service and maintenance to the heating, ventilation, and engine cooling system.

Automotive Service Technology I—Course Code: 997000

Unit		Title	Hours
1		Automotive Shop Operations	40
2		Engine Repair	55
3		Engine Transmission	35
4		Basic Electrical/Electronic Systems	75
5		Automotive Brakes	75
			280

Automotive Service Technology II—Course Code: 997001

Unit		Title	Hours
6		Automotive Shop Operations Review	30
7		Advanced Electrical/Electronic Systems	70
8		Engine Performance	40
9		Advanced Engine Performance	40
10		Suspension/Steering Systems	50
11		Automotive Heating and Air	50
			280

- ✓ Scheduling and operating more than one course in the same classroom/laboratory with the same teacher is not allowed.
- ✓ Students must complete the first year with a score of 80/C or higher in classwork to advance to the next level.
- ✓ To effectively assess mastery respective to a course's instructional hours, the pathway blueprint will test units upon completion of their last hour of instruction.

Engineering

Program CIP: 14.1901

Ordering Information

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~~people of the state. The RCU works within the contexts of curriculum development and revision, research, assessment, professional development, and industrial training.~~

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Acknowledgments

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Dr. Hank M. Bounds, Executive Secretary
Mr. Claude Hartley, Chair
Mr. William Harold Jones, Vice Chair
Mr. Howell "Hal" N. Gage
Dr. O. Wayne Gann
Ms. Rebecca Harris
Mr. Charles McClelland
Ms. Sondra Parker Caillavet
Ms. Rosetta Richards
Dr. David Sistrunk

Mike Mulvihill, Interim Associate State Superintendent of Education for the Office of Vocational Education and Workforce Development, at the Mississippi Department of Education assembled an oversight committee to provide input throughout the development of the *Engineering Curriculum Framework and Supporting Materials.* Members of this task force were as follows:

Dr. Kay Berry, Simpson County School District
Dr. Sam Bounds, Mississippi Association of School Superintendents
Kevin F. Gilbert, Mississippi Association of Educators
David Campbell, Mississippi Association of Middle Level Educators
Tommye Dale Favre, Mississippi Department of Employment Security
Mary Hardy, Mississippi PTA
Anna Hurt, Mississippi Association of School Administrators
Jay Moon, Mississippi Manufacturers Association
Dr. Dean Norman, Center for Advanced Vehicular Systems Extension
Michael Ray, Western Line School District
George Schloegal, Hancock Bank
Charlene Sproles, Mississippi School Counselor Association
Mike Thomas, North American Coal Corporation
Pete Walley, Institutions of Higher Learning
Clarence Ward, Boys and Girls Clubs of the Gulf Coast
Debra West, State Board for Community and Junior Colleges

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Dr. Paul Cuicchi, Starkville Public Schools
Sharon Hudson, Mississippi Department of Education
Carol Ingram, Lamar County Public Schools
Jeff Jones, Mississippi Gulf Coast Community College
Mattie Jones, Pontotoc Career Center
Jean Massey, Rankin County Schools
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Myra Pannell, Research and Curriculum Unit
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Cindy West, Hinds Community College
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Patrick Ray, West Point Career and Technology Center, West Point, MS
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Bill McGrew, Program Coordinator, Office of Vocational Education and Workforce Development, Mississippi Department of Education, Jackson, MS

Finally, standards in the *Engineering Curriculum Framework and Supporting Materials* are based on the following:

International Technology Education Association (ITEA) Standards
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Applied Academic Credit Benchmarks
Mississippi Department of Education 2007 Mississippi Mathematics and Physics Framework Revised

21st Century Skills and Information and Communication Technologies Literacy Standards
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Engineering Executive Summary

Program Description

Engineering is a program in pre-engineering for high school students. The purpose of the program is to provide students with expanded knowledge of the use of technological skills and to enable them to solve problems by applying knowledge in a technological context. The program is designed to provide students with hands-on experiences related to the application of engineering concepts in the workplace. Students will develop academic and technical skills, 21st century skills, and human relations competencies that accompany technical skills for job success and lifelong learning. Students who complete the program will be better prepared to enter and succeed in engineering programs offered by Mississippi community and junior colleges and institutions of higher education.

Industry Certification

Engineering: Most engineering programs involve a concentration of study in an engineering specialty along with courses in both mathematics and the physical and life sciences. Many programs also include courses in general engineering. A design course, sometimes accompanied by a computer or laboratory class or both, is part of the curriculum of most programs. General courses not directly related to engineering, such as those in the social sciences or humanities, are also often required.

In addition to the standard engineering degree, many colleges offer 2-year or 4-year degree programs in engineering technology. These programs, which usually include various hands-on laboratory classes that focus on current issues in the application of engineering principles, prepare students for practical design and production work, rather than for jobs that require more theoretical and scientific knowledge. Graduates of 4-year technology programs may get jobs similar to those obtained by graduates with a bachelor's degree in engineering. Engineering technology graduates, however, are not qualified to register as professional engineers under the same terms as graduates with degrees in engineering. Some employers regard technology program graduates as having skills between those of a technician and an engineer.

All states and the District of Columbia require licensure for engineers who offer their services directly to the public. Engineers who are licensed are called Professional Engineers (PEs). This licensure generally requires a degree from an ABET-accredited engineering program, 4 years of relevant work experience, and successful completion of a state examination. Recent graduates can start the licensing process by taking the examination in two stages. The initial Fundamentals of Engineering (FE) examination can be taken upon graduation. Engineers who pass this examination commonly are called Engineers in Training (EIT) or Engineer Interns (EIs). After acquiring suitable work experience, EITs can take the second examination, the Principles and Practice of Engineering exam.

Assessment

Students will be assessed using the Engineering MS-CPAS2 test. The MS-CPAS2 blueprint can be found at http://info.rcu.msstate.edu/services/curriculum.asp. If there are questions regarding assessment of this program, please contact the STEM instructional design specialist at the Research and Curriculum Unit at 662.325.2510.

Student Prerequisites

In order for students to experience success in the Engineering program, the following prerequisites are recommended:

1. C or Higher in Pre-Algebra

   or

2. TABE Math Computation and TABE Math Applied Score (eighth grade or higher)

   or

3. Instructor Approval

Proposed Applied Academic Credit

Applied Mathematics content from the curriculum was aligned to the 2007 Mississippi Mathematics Framework Revised Academic Benchmarks. It is proposed that upon the completion of this program, students will earn 1/2 Applied Mathematics credit that can be used for graduation requirements.

Applied Physics content from the curriculum was aligned to the 2010 Mississippi Science Framework Revised Academic Benchmarks. It is proposed that upon the completion of this program, students will earn 1/2 Applied Physics credit that can be used for graduation requirements.

The applied academic credit has not been approved by the Mississippi Commission on School Accreditation or by the State Board of Education. If there are questions regarding applied academic credit, please contact the Coordinator of Workforce Education at the Research and Curriculum Unit at 662.325.2510.

Licensure Requirements

The 985 licensure endorsement is needed to teach the Engineering program. The requirements for the 985 licensure endorsement are listed below:

1. Applicant must have earned a 4-year degree (bachelor's degree) or higher from an accredited institution of higher education. The degree must be in engineering, mathematics, or an appropriate field of science and must be approved by the MDE program coordinator.
2. Applicant must enroll immediately in the Vocational Instructor Preparation (VIP) or the Redesign Education Program (REP).
3. Applicant must complete the individualized Professional Development Plan (PDP) requirements of the VIP or REP prior to the expiration date of the 3-year vocational license.
4. Applicant must successfully complete an MDE-approved computer literacy certification exam.
5. Applicant must successfully complete certification for an online learning workshop, module, or course that is approved by the MDE.
6. Applicant must successfully complete an Engineering certification workshop, module, or course that is approved by the MDE.

Note: If an applicant meets all requirements listed above, that applicant will be issued a 985 endorsement – a 5-year license. If the applicant does not meet all requirements, the applicant may be issued a 3-year endorsement (license), and all requirements must be satisfied prior to the ending date of that license.

Exception: LEAs converting to this pathway from existing programs in Technology Applications (with teachers currently licensed and endorsed #994 Technology Applications) may continue to employ those teachers and seek 985 endorsement for them although they do not meet the above stated requirement for a 4-year degree in certain major fields of study. These teachers must satisfy all other requirements stated above. All other teachers must meet the requirements for this endorsement.

Professional Learning

The professional learning itinerary for the middle school or individual pathways can be found at http://redesign.rcu.msstate.edu. If you have specific questions about the content of each training session provided, please contact the Research and Curriculum Unit at 662.325.2510, and ask for the Professional Learning Specialist.

Course Outlines

Program CIP Code: 14.1901

This curriculum framework is divided into four one-Carnegie-unit courses as outlined below. The first two courses are comprised of units from Engineering Year 1. The last two courses are comprised of units from Engineering Year 2.

Option 1 – Four One-Carnegie-Unit Courses

Course Description: Engineering Fundamentals teaches students the history of engineering and the careers associated with the field. The students will also learn the foundations and fundamentals of engineering and materials. This course also teaches technical writing, presenting, and project management.

Course Description: Engineering Design teaches students the engineering design process, the steps one follows for successful design planning. Students are also introduced to the advanced concepts of 3-D sketching and modeling with CAD software. This course also focuses on quality control and the benefits of engineering failure.

Course Description: Systems in Engineering is a comprehensive course that focuses on the following four systems: electrical, fluid, mechanical, and thermal. It also introduces students to Computer Integrated Manufacturing, or how robotics and drafting work together to create products.

Course Description: Applied Engineering Concepts teaches students the concepts of digital electronic control system technology, focusing on electronics, gates, and truth tables. Students will also learn valuable workforce readiness skills and participate in a self-directed project that focuses on concepts associated with engineering.

Engineering Fundamentals (One Carnegie Unit) – Course Code: 994002

Unit		Title	Hours
1		Orientation and Safety	8
2		Engineering History, Ethics, and Careers	12
3		Writing, Presenting, and Project Management	20
4		Introduction to Robotics	100
			140

Engineering Design (One Carnegie Unit) – Course Code: 994003

Unit		Title	Hours
5		Engineering Design Process	40
6		Sketching and Modeling	60
7		Production, Quality Control, and Engineering Failure	40
			140

~~Systems in Engineering (One Carnegie Unit) - Course Code: 994004~~

~~Unit~~		~~Title~~	~~Hours~~
~~8~~		~~The Four Systems~~	~~80~~
~~9~~		~~CIM—Computer Integrated Manufacturing~~	~~60~~
			~~140~~

~~Applied Engineering Concepts (One Carnegie Unit) - Course Code: 994005~~

~~Unit~~		~~Title~~	~~Hours~~
~~10~~		~~Advanced Robotics~~	~~100~~
~~11~~		~~Digital Electronic Control System Technology~~	~~20~~
~~12~~		~~Workforce Readiness~~	~~20~~
			~~140~~

~~Option 2—Two Two-Carnegie-Unit Courses~~

~~Course Description: Engineering I~~ ~~teaches students the history of engineering and the careers associated with the field. The students will also learn the foundations and fundamentals of engineering and materials. This course also teaches technical writing, presenting, and project management. It also teaches students the engineering design process, the steps one follows for successful design planning. Students are also introduced to the advanced concepts of 3-D sketching and modeling with CAD software. This course also focuses on quality control and the benefits of engineering failure.~~

~~Course Description: Engineering II~~ ~~is a comprehensive course that focuses on the four systems: electrical, fluid, mechanical, and thermal. It also introduces students to Computer Integrated Manufacturing, or how robotics and drafting work together to create products. This course teaches students the concepts of digital electronic control system technology, focusing on electronics, gates, and truth tables. Students will also learn valuable workforce readiness skills and participate advanced concepts of programming robotic equipment.~~

~~Engineering I (Two Carnegie Units) - Course Code: 994000~~

~~Unit~~		~~Title~~	~~Hours~~
~~1~~		~~Orientation and Safety~~	~~8~~
~~2~~		~~Engineering History, Ethics, and Careers~~	~~12~~
~~3~~		~~Writing, Presenting, and Project Management~~	~~20~~
~~4~~		~~Introduction to Robotics~~	~~100~~
~~5~~		~~Engineering Design Process~~	~~40~~
~~6~~		~~Sketching and Modeling~~	~~60~~
~~7~~		~~Production, Quality Control, and Engineering Failure~~	~~40~~
			~~280~~

~~Engineering II (Two Carnegie Units) - Course Code: 994001~~

~~Unit~~		~~Title~~	~~Hours~~
~~8~~		~~The Four Systems~~	~~80~~
~~9~~		~~CIM – Computer Integrated Manufacturing~~	~~60~~
~~10~~		~~Advanced Robotics~~	~~100~~
~~11~~		~~Digital Electronic Control System Technology~~	~~20~~
~~12~~		~~Workforce Readiness~~	~~20~~
			~~280~~

2014 Engineering

Mississippi Department of Education

Program CIP: 14.0101-Engineering, General

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The Research and Curriculum Unit (RCU), located in Starkville, MS, as part of Mississippi State University, was established to foster educational enhancements and innovations. In keeping with the land grant mission of Mississippi State University, the RCU is dedicated to improving the quality of life for Mississippians. The RCU enhances intellectual and professional development of Mississippi students and educators while applying knowledge and educational research to the lives of the people of the state. The RCU works within the contexts of curriculum development and revision, research, assessment, professional development, and industrial training.

Preface

Secondary career and technical education programs in Mississippi face many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act IV, 2007; and No Child Left Behind Act of 2001).

Pathway Description

Engineering is a program in pre-engineering and robotics for high school students. The purpose of the program is to provide students with expanded knowledge of the use of technological skills and to enable them to solve problems by applying knowledge in a technological context. The program is designed to provide students with hands-on experiences related to the application of engineering concepts in the workplace. Students will develop academic and technical skills, 21st century skills, and human relations competencies that accompany technical skills for job success and lifelong learning. Students who complete the program will be better prepared to enter and succeed in engineering programs offered by Mississippi community and junior colleges and institutions of higher education.

Industry Certification

Most engineering programs involve a concentration of study in an engineering specialty along with courses in both mathematics and the physical and life sciences. Many programs also include courses in general engineering. A design course, sometimes accompanied by a computer or laboratory class or both, is part of the curriculum of most programs. General courses not directly related to engineering, such as those in the social sciences or humanities, are also often required. In addition to the standard engineering degree, many colleges offer 2-year or 4-year degree programs in engineering technology. These programs, which usually include various hands-on laboratory classes that focus on current issues in the application of engineering principles, prepare students for practical design and production work, rather than for jobs that require more theoretical and scientific knowledge. Graduates of 4-year technology programs may get jobs similar to those obtained by graduates with a bachelor's degree in engineering. Engineering

technology graduates, however, are not qualified to register as professional engineers under the same terms as graduates with degrees in engineering. Some employers regard technology program graduates as having skills between those of a technician and an engineer.

Although most engineering jobs require a degree, the Certified SolidWorks Associate (CSWA) industry certification shows competence in using SolidWorks software and can benefit students applying for jobs in the field. Interested students are encouraged to sharpen and expand upon the skills learned in this course in pursuit of this certification.

Assessment

The latest assessment blueprint for the curriculum can be found at

http://www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Student Prerequisites

In order for students to experience success in the Engineering program, the following prerequisites are suggested:

1. C or Higher in Pre-Algebra

   or

2. TABE Math Computation and TABE Math Applied Score (eighth grade or higher)

   or

3. Instructor Approval

Applied Academic Credit

The *Engineering Curriculum Framework* is aligned to the physics content in the Mississippi 2010 Science Framework and has been approved by a panel of professional science educators to satisfy academic-equivalent physics credit. The Office of Accreditation has approved the

recommendation effective the 2012-2013 school year. The Institution of Higher Learning the student attends will decide if the equivalent credit can be awarded as a science.

Licensure Requirements

The most current teacher licensure information can be found at http://www.mde.k12.ms.us/educator-licensure.

Professional Learning

If you have specific questions about the content of any of training sessions provided, please contact the Research and Curriculum Unit at 662.325.2510 and ask for a professional-learning specialist.

Option 1 – Four One-Carnegie-Unit Courses

This curriculum consists of four one-credit courses, which should be completed in the following sequence:

1. **Engineering Fundamentals—Course Code: 994002**
2. **Engineering Design—Course Code: 994003**
3. **Systems in Engineering—Course Code: 994004**
4. **Applied Engineering Concepts—Course Code: 994005**

Course Description: Engineering Fundamentals

Engineering Fundamentals teaches students the history of engineering and the careers associated with the field. The students will also learn the foundations and fundamentals of engineering and materials, as well as the engineering design process and the steps one follows for successful design planning. Additionally, students are introduced to the advanced concepts of 3-D sketching and modeling with CAD software.

Course Description: Engineering Design

Engineering Design introduces students to the field of robotics in engineering. It also focuses on several fields of engineering specialization.

Course Description: Systems in Engineering

Systems in Engineering is a comprehensive course that focuses on the following four systems: electrical, fluid, mechanical, and thermal. It also introduces students to flexible manufacturing systems, or how robotics and drafting work together to create products.

Course Description: Applied Engineering Concepts

Applied Engineering Concepts teaches students advanced robotic concepts. Students will also learn valuable workforce readiness skills and prepare for jobs in the field of engineering.

Engineering Fundamentals—Course Code: 994002

Unit	Unit Name	Hours
1	Orientation, Ethics, and Safety	5
2	Engineering Design Process, History, and Careers	10
3	Industrial Engineering Focus	20
4	Civil Engineering Focus	20
5	Sketching and Modeling	85
Total		140

Engineering Design—Course Code: 994003

Unit	Unit Name	Hours
6	Introduction to Robotics[1]	80
7	Environmental Engineering Focus	20
8	Electrical Engineering Focus	20
9	Computer Engineering Focus	20
		140

Systems in Engineering—Course Code: 994004

Unit	Unit Name	Hours
10	The Four Systems: Electrical Systems[1]	30
11	The Four Systems: Fluid Systems[1]	30
12	The Four Systems: Mechanical Systems[1]	30
13	The Four Systems: Thermal Systems[1]	30
14	Flexible Manufacturing System (FMS)[1]	20
Total		140

Applied Engineering Concepts—Course Code: 994005

Unit	Unit Name	Hours
15	Advanced Robotics[1]	120
16	Workforce Readiness	20
Total		140

[1] This unit focuses on content from the mechanical engineering field.

Option 2 – Two Two-Carnegie-Unit Courses

This curriculum consists of two two-credit courses, which should be completed in the following sequence:

1. **Engineering I—Course Code: 994000**

2. **Engineering II—Course Code: 994001**

Course Description: Engineering I
Engineering I teaches students the history of engineering and the careers associated with the field. The students will also learn the foundations and fundamentals of engineering and materials, as well as the engineering design process and the steps one follows for successful design planning. Additionally, students are introduced to the advanced concepts of 3-D sketching and modeling with CAD software. The course introduces students to the field of robotics in engineering. It also focuses on several fields of engineering specialization.

Course Description: Engineering II
Engineering II is a comprehensive course that focuses on the following four systems: electrical, fluid, mechanical, and thermal. It also introduces students to flexible manufacturing systems, or how robotics and drafting work together to create products. Additionally, the course teaches students advanced robotic concepts. Students will also learn valuable workforce readiness skills and prepare for jobs in the field of engineering.

Engineering I—Course Code: 994000

Unit	Unit Name	Hours
1	Orientation, Ethics, and Safety	5
2	Engineering Design Process, History, and Careers	10
3	Industrial Engineering Focus	20
4	Civil Engineering Focus	20
5	Sketching and Modeling	85
6	Introduction to Robotics[2]	80
7	Environmental Engineering Focus	20
8	Electrical Engineering Focus	20
9	Computer Engineering Focus	20
Total		280

Engineering II—Course Code: 994001

Unit	Unit Name	Hours
10	The Four Systems: Electrical Systems[2]	30
11	The Four Systems: Fluid Systems[2]	30
12	The Four Systems: Mechanical Systems[2]	30
13	The Four Systems: Thermal Systems[2]	30

[2] This unit focuses on content from the mechanical engineering field.

14	Flexible Manufacturing System (FMS)[2]	20
15	Advanced Robotics[2]	120
16	Workforce Readiness	20
Total		280

2007 Mississippi Curriculum Framework

Secondary Food Products (Meats)

(Program CIP: 01.0401 – Agricultural and Food Products Processing)

Direct inquiries to

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RCU Staff	Stephanie King – Instructional Design Specialist Rodney Beasley – Instructional Design Specialist
MDE Staff	Wilbur Chancellor – Agricultural Education Program Coordinator
Professional Curriculum Advisory Team	Hinds Community College Meat Merchandising Advisory Committee

Standards in this document are based on information from the following organizations:

Agriculture, Food, and Natural Resources Standards	Adapted from the publication, *Career Cluster Resources for Agriculture, Food, and Natural Resources*, National Association of State Directors of Career and Technical Education
Academic Standards	Mississippi Department of Education Subject Area Testing Program
21st Century Skills	Reproduced with permission of the Partnership for 21st Century Skills. Further information may be found at www.21stcenturyskills.org

Preface

Secondary Food Products (Meats) Research Synopsis

Articles, books, Web sites, and other materials listed at the end of each unit were considered during the revision process. The textbooks *Principles of Meat Science* and *The Meat We Eat;* journals and magazines such as *The National Provisioner* and *The Packaging Digest*; and organizations including The American Meat Institute, National FFA, and the U.S. Department of Labor were especially useful in providing insight into trends and issues in the field. These references are suggested for use by instructors and students during the study of the topics outlined.

Industry advisory team members from schools throughout the state were asked to give input related to changes to be made to the curriculum framework. Specific comments related to soft skills needed in this program included a strong work ethic, manners, respect, responsibility, communication skills, good attitude, and punctuality. Occupation-specific skills stated included performing calculations, knowledge of cuts, figuring mark-up and profit margin, computer skills, and charting. Safety practices emphasized included equipment safety and sanitation.

Instructors from schools throughout the state were also asked to give input on changes to be made to the curriculum framework. Changes suggested for the curriculum included addition of goat processing, wild game processing, and verification of animal health prior to slaughter. In addition, due to the lack of slaughter facilities in some schools, a reduction in the number of hours spent covering slaughter was requested.

Curriculum

The following state/national standards were referenced in each course of the curriculum.

- *Mississippi Department of Education Subject Area Testing Program Academic Standards*
- *21st Century Skills*
- *Career Cluster Resources for Agriculture, Food, and Natural Resources* as published by the National Association of State Directors of Career and Technical Education

Industry and instructor comments, along with current research, were considered by the curriculum revision team during the revision process; and changes were made as needed and appropriate. Many of the skills and topics noted in the research were already included in the curriculum framework. Specific changes made to the curriculum at the March, 2006, curriculum revision meeting included:

- Competencies and objectives were reviewed to ensure accuracy and appropriateness.
- The number of hours suggested for units related to custom slaughter and fabrication of lamb was reduced.
- The verbs used for the competencies related to custom slaughter were changed to accommodate schools without slaughter facilities.
- Goat fabrication was added to the lamb fabrication unit.
- The units on poultry and fish fabrication were combined.
- A unit on fabrication of wild game was added.
- Information related to waste management was added.

- The Recommended Tools and Equipment list was updated, and the number of freezer racks and freezer trucks was increased.

Assessment

Students will be assessed using the *Secondary Food Products (Meats) MS-CPAS2 Test*.

Professional Learning

It is suggested that instructors participate in professional learning related to the following concepts:

- How to use the Mississippi Agriculture Education BRIDGE site on Blackboard®
- Differentiated instruction – To learn more about differentiated instruction, please go to http://www.paec.org/teacher2teacher/additional_subjects.html and click on Differentiated Instruction. Work through this online course and review the additional resources.

Foreword

Secondary vocational-technical education programs in Mississippi are faced with many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act III, 1998; and No Child Left Behind Act of 2001).

Each secondary vocational-technical course consists of a series of instructional units which focus on a common theme. All units have been written using a common format which includes the following components:

- Unit Number and Title
- Suggested Time on Task - An estimated number of clock hours of instruction that should be required to teach the competencies and objectives of the unit. A minimum of 140 hours of instruction is required for each Carnegie unit credit. The curriculum framework should account for approximately 75-80 percent of the time in the course.
- Competencies and Suggested Objectives
  - A competency represents a general concept or performance that students are expected to master as a requirement for satisfactorily completing a unit. Students will be expected to receive instruction on all competencies.
  - The suggested objectives represent the enabling and supporting knowledge and performances that will indicate mastery of the competency at the course level.
- Suggested Teaching Strategies - This section of each unit indicates strategies that can be used to enable students to master each competency. Emphasis has been placed on strategies which reflect active learning methodologies. Teachers should feel free to modify or enhance these suggestions based on needs of their students and resources available in order to provide optimum learning experiences for their students.
- Suggested Assessment Strategies - This section indicates strategies that can be used to measure student mastery. Examples of suggested strategies could include rubrics, class participation, reflection, and journaling. Again, teachers should feel free to modify or enhance these suggested assessment strategies based on local needs and resources.

- ~~Integrated Academic Topics, Workplace Skills, Technology Standards, and Occupational Standards - This section identifies related academic topics as required in the Subject Area Assessment Program (SATP) in Algebra I, Biology I, English II, and U. S. History from 1877, which are integrated into the content of the unit. It also identifies the 21st Century Skills, which were developed by the Partnership for 21st Century Skills, a group of business and education organizations concerned about the gap between the knowledge and skills learned in school and those needed in communities and the workplace. A portion of the 21st Century Skills addresses learning skills needed in the 21st century, including information and communication skills, thinking and problem-solving skills, and interpersonal and self-directional skills. The need for these types of skills has been recognized for some time and the 21st Century Skills are adapted in part from the 1991 report from the U.S. Secretary of Labor's Commission on Achieving Necessary Skills (SCANS). Another important aspect of learning and working in the 21st century involves technology skills, and the International Society for Technology in Education, developers of the National Educational Technology Standards (NETS), were strategic partners in the Partnership for 21st Century Skills.~~
- ~~References - A list of suggested references is provided for each unit. The list includes some of the primary instructional resources that may be used to teach the competencies and suggested objectives. Again, these resources are suggested and the list may be modified or enhanced based on needs and abilities of students and on available resources.~~

Table of Contents

~~Program Description~~

~~The Food Products (Meats) program is designed to prepare the student for entry level employment in the various related phases of processing, marketing, and merchandising of meats. Students are exposed to career and leadership opportunities within their field of study. Students are given an opportunity to master the skills necessary for success in meat processing which may include slaughtering, chilling, aging, quartering, cutting, and inspecting pork, beef, lamb, poultry, goat, wild game, and fish.~~

~~Industry standards referenced are from the *Agriculture, Food, and Natural Resources Standards*.~~

Course Outline

Food Products (Meats) I

Course CIP Code: 01.0401

Course Description: Food Products (Meats) I is an instructional program that orients an individual to the field of meat processing, marketing, and merchandising. This course allows an individual to prepare for employment or continued education in the meat cutting, packing, and processing professions. Topics include careers, leadership, and orientation; safety, sanitation, equipment, and facility maintenance; livestock slaughter procedures; and pricing, wrapping, and marketing meats. (2 – 2½ Carnegie units, depending upon time spent in the course)

Unit	Title	Hours
1	Careers and Leadership	15.0
2	Orientation to Meat Processing	15.0
3	Safety, Sanitation, Equipment, and Facility Maintenance	75.0
4	Custom Livestock Slaughter	40.0
5	Pricing, Wrapping, and Marketing	22.5
6	Special Topics in Food Products (Meats) I	32.5

Food Products (Meats) II

Course CIP Code: 01.0490

Course Description: Food Products (Meats) II is a continuation of Food Products (Meats) I. This course allows an individual to prepare for employment or continued education in the meat cutting, packing, and processing professions. Topics include meat cutting; automated processing; quality and yield grading; and curing, smoking, and sausage making. (2 – 2½ Carnegie units, depending upon time spent in the course)

Unit	Title	Hours
1	Identification and Fabrication of Carcass and Box Beef	60.0
2	Identification and Fabrication of Carcass and Box Pork	37.5
3	Identification and Fabrication of Carcass Lamb and Goat	15.0
4	Identification and Fabrication of Poultry and Fish	7.5
5	Identification and Fabrication of Wild Game	20.0
6	Automated Processing of Meats	7.5
7	Quality and Yield Grading	18.0
8	Curing, Smoking, and Sausage Making	18.0
9	Special Topics in Food Products (Meats) II	18.0

2014 Food Products (Meats)

Mississippi Department of Education

Program CIP: 01.0401 – Agricultural and Food Products Processing

Direct inquiries to

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Pathway Description

Food Products (Meats) is an instructional program that orients an individual to the field of meat processing, marketing, and merchandising. This course allows an individual to prepare for employment or continued education in the meat cutting, packing, and processing professions. Topics include careers, leadership, and orientation; safety, sanitation, equipment, and facility maintenance; livestock slaughter procedures; and pricing, wrapping, and marketing meats.

Industry Certification

Competencies and suggested performance indicators in the Food Products (Meats) course have been correlated, to the National Agriculture, Food, and Natural Resources (AFNR) Career Cluster Content Standards. The AFNR standards have been reviewed and endorsed at the national level by the National Council on Agricultural Education.

Assessment

The latest assessment blueprint for the curriculum can be found at http://www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Student Prerequisites

In order for students to be able to experience success in the Food Products (Meats) program, the following student prerequisites are suggested:

1. C or higher in English (the previous year)
2. C or higher in Math (last course taken or the instructor can specify the math)
3. Instructor Approval and TABE Reading Score (eighth grade or higher)

or

1. TABE Reading Score (eighth grade or higher)

2. Instructor Approval

or

1. Instructor Approval

Teacher Licensure

The latest teacher licensure information can be found at

http://www.mde.k12.ms.us/educator-licensure

Professional Learning

If you have specific questions about the content of each training session provided, please contact the Research and Curriculum Unit at 662.325.2510, and ask for the Professional Learning Specialist.

Option 1—Four One-Carnegie-Unit Courses

This curriculum consists of four one-credit courses, which should be completed in the following sequence:

1. **Food Products (Meats): Fundamentals—Course Code: 991202**
2. **Food Products (Meats): Custom Operations—Course Code: 991203**
3. **Food Products (Meats): Basic Meats Processing—Course Code: 991204**
4. **Food Products (Meats): Advanced Meats Processing—Course Code: 991205**

Course Description: **Food Products (Meats): Fundamentals**

This option allows an individual to prepare for employment or continued education in the meat cutting, packing, and processing professions. Topics include orientation to meat processing, safety, sanitation, equipment, and facility maintenance.

Course Description: **Food Products (Meats): Custom Operations**

This option allows an individual to prepare for employment or continued education in the meat cutting, packing, and processing professions. Topics include custom livestock slaughter, pricing, wrapping, and marketing.

Course Description: Food Products (Meats): Basic Meats Processing

This option allows an individual to prepare for employment or continued education in the meat cutting, packing, and processing professions. Topics include identification and fabrication of carcass beef, box pork, carcass lamb and goat.

Course Description: Food Products (Meats): Advanced Meats Processing

This option allows an individual to prepare for employment or continued education in the meat cutting, packing, and processing professions. Topics include identification and fabrication of

poultry and fish wild game, automated processing of meats quality and yield grading, curing, smoking, and sausage making.

Food Products (Meats): Fundamentals—Course Code: 991202

Unit	Unit Name	Hours
1	Careers and Leadership	35
2	Orientation to Meat Processing	15
3	Safety, Sanitation, Equipment, and Facility Maintenance	75
Total		125

Food Products (Meats): Custom Operations—Course Code: 991203

Unit	Unit Name	Hours
4	Custom Livestock Slaughter	40
5	Pricing, Wrapping, and Marketing	23
6	Special Topics in Food Products (Meats) I	32
Total		95

Food Products (Meats): Basic Meats Processing—Course Code: 991204

Unit	Unit Name	Hours
7	Identification and Fabrication of Carcass and Box Beef	60
8	Identification and Fabrication of Carcass and Box Pork	37
9	Identification and Fabrication of Carcass Lamb and Goat	15
Total		112

Food Products (Meats): Advanced Meats Processing—Course Code: 991205

Unit	Unit Name	Hours
10	Identification and Fabrication of Poultry and Fish	10
11	Identification and Fabrication of Wild Game	20
12	Automated Processing of Meats	10
13	Quality and Yield Grading	20
14	Curing, Smoking, and Sausage Making	20
15	Special Topics in Food Products (Meats) II	20
Total		100

Option 2—Two Two-Carnegie-Unit Courses

This curriculum consists of two two-credit courses, which should be completed in the following sequence:

1. **Food Products (Meats) I—Course Code: 991200**
2. **Food Products (Meats) II—Course Code: 991201**

Course Description: **Food Products (Meats) I**

Food Products (Meats) I is an instructional program that orients an individual to the field of meat processing, marketing, and merchandising. This course allows an individual to prepare for employment or continued education in the meat cutting, packing, and processing professions. Topics include careers, leadership, and orientation, safety, sanitation, equipment, and facility maintenance, livestock slaughter procedures, and pricing, wrapping, and marketing meats.

Course Description: **Food Products (Meats) II**

Food Products (Meats) II is a continuation of Food Products (Meats) I. This course allows an individual to prepare for employment or continued education in the meat cutting, packing, and processing professions. Topics include meat cutting, automated processing, quality and yield grading, and curing, smoking, and sausage making.

Food Products (Meats) I—Course Code: 991200

Unit	Unit Name	Hours
1	Careers and Leadership	35
2	Orientation to Meat Processing	15
3	Safety, Sanitation, Equipment, and Facility Management	75
4	Custom Livestock Slaughter	40
5	Pricing, Wrapping, and Marketing	23
6	Special Topics in Food Products (Meats) I	32
Total		220

Food Products (Meats) II—Course Code: 991201

Unit	Unit Name	Hours
7	Identification and Fabrication of Carcass and Box Beef	60
8	Identification and Fabrication of Carcass and Box Pork	37
9	Identification and Fabrication of Carcass Lamb and Goat	15
10	Identification and Fabrication of Poultry and Fish	10
11	Identification and Fabrication of Wild Game	20
12	Automated Processing of Meats	10
13	Quality and Yield Grading	20
14	Curing, Smoking, and Sausage Making	20
15	Special Topics in Food Products (Meats) II	20
Total		212

2006 Mississippi Curriculum Framework

Secondary Forestry

(Program CIP: 03.0511 – Forestry Technology/Technician)

Direct inquiries to

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Mississippi Department of Education
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Research and Curriculum Unit for Workforce Development
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Mississippi State, MS 39762

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Standards in this document are based on information from the following organizations:

Proposed Standards for Mississippi Agriculture Education Programs	Adapted from the publication, *Career Cluster Resources for Agriculture, Food, and Natural Resources*, National Association of State Directors of Career and Technical Education
Academic Standards	Mississippi Department of Education Subject Area Testing Program
Workplace Skills for the 21st Century	Secretary's Commission on Achieving Necessary Skills
National Educational Technology Standards for Students	Reprinted with permission from *National Educational Technology Standards for Students: Connecting Curriculum and Technology*, copyright © 2000, ISTE (International Society for Technology in Education), 1.800.336.5191 (U.S. & Canada) or 1.541.302.3777 (International), iste@iste.org, www.iste.org. All rights reserved. Permission does not constitute an endorsement by ISTE.

Foreword

Secondary vocational-technical education programs in Mississippi are faced with many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act III, 1998; and No Child Left Behind Act of 2001).

Each secondary vocational-technical course consists of a series of instructional units which focus on a common theme. All units have been written using a common format which includes the following components:

- Unit Number and Title
- Suggested Time on Task - An estimated number of clock hours of instruction that should be required to teach the competencies and objectives of the unit. A minimum of 140 hours of instruction is required for each Carnegie unit credit. The curriculum framework should account for approximately 75-80 percent of the time in the course.
- Competencies and Suggested Objectives
  - A competency represents a general concept or performance that students are expected to master as a requirement for satisfactorily completing a unit. Students will be expected to receive instruction on all competencies.
  - The suggested objectives represent the enabling and supporting knowledge and performances that will indicate mastery of the competency at the course level.
- Suggested Teaching Strategies - This section of each unit indicates strategies that can be used to enable students to master each competency. Emphasis has been placed on strategies which reflect active learning methodologies. Teachers should feel free to modify or enhance these suggestions based on needs of their students and resources available in order to provide optimum learning experiences for their students.
- Suggested Assessment Strategies - This section indicates strategies that can be used to measure student mastery. Examples of suggested strategies could include rubrics, class participation, reflection, and journaling. Again, teachers should feel free to modify or enhance these suggested assessment strategies based on local needs and resources.

- ~~Integrated Academic Topics, Workplace Skills, Technology Standards, and Occupational Standards - This section identifies related academic topics as required in the Subject Area Assessment Program (SATP) in Algebra I, Biology I, English II, and U. S. History from 1877, which are integrated into the content of the unit. It also identifies the general workplace skills as identified in the Secretary's Commission on Achieving Necessary Skills (SCANS) report as being critical for all workers in the 21st Century. In addition, national technology standards and occupational skills standards associated with the competencies and suggested objectives for the unit are also identified.~~
- ~~References - A list of suggested references is provided for each unit. The list includes some of the primary instructional resources that may be used to teach the competencies and suggested objectives. Again, these resources are suggested and the list may be modified or enhanced based on needs and abilities of students and on available resources.~~

Table of Contents

Program Description

Forestry is an instructional program designed to prepare students to enter occupations related to the field of forestry. The first year topics include Exploring the World of Forestry; Leadership/FFA Activities; Forest Safety; Tree Growth and Stand Development; Dendrology; Forest Surveying and Mapping; Legal Land Descriptions; Tree and Log Measurements; and Introduction to Timber Cruising. The second year instruction focuses on Identifying Forests and Forest Products; Employability Skills/FFA Activities; Forest Management Practices; Advanced Timber Cruising; Timber Marketing; Timber Harvesting; Reforestation; Forest Fire Management; and Forest Insects and Diseases. Graduates may become employed at the entry level or pursue careers in Forestry, Agriculture, Agribusiness, or Natural Resources Education in postsecondary or higher education.

Industry standards are adapted from the publication *Career Cluster Resources for Agriculture, Food, and Natural Resources*, developed by the National Association of State Directors of Career and Technical Education.

Course Outline

Forestry I

Course CIP Code: 03.0401

Course Description: Forestry I is designed to introduce the student to the forest industry and forestry careers in Mississippi. The course provides instruction on forest careers and leadership, forest safety, tree growth and development, dendrology, surveying and mapping, and tree and log measurements. Emphasis is placed on the scientific and technical principles of modern forest management. (2-2½ Carnegie units depending on time spent in course.)

Unit	Title	Hours
1	Exploring the World of Forestry	7.5
2	Leadership/FFA Activities	7.5
3	Forest Safety	15
4	Tree Growth and Stand Development	7.5
5	Dendrology	30
6	Forest Surveying and Mapping	37.5
7	Legal Land Descriptions	30
8	Tree and Log Measurements	37.5
9	Introduction to Timber Cruising	45

Forestry II

Course CIP Code: 03.0490

Course Description: Forestry II is a continuation of Forestry I with additional emphasis on forest management, timber cruising, marketing and harvesting methods, reforestation, fire management, and forest pests. Emphasis is placed on scientific and technical priniciples. (2-2½ Carnegie units depending on time spent in course)

Unit	Title	Hours
1	Identifying Forests and Forest Products	7.5
2	Employability Skills/FFA Activities	7.5
3	Forest Management Practices	45
4	Advanced Timber Cruising	52.5
5	Timber Marketing	15
6	Timber Harvesting	15
7	Reforestation	22.5
8	Forest Fire Management	22.5
9	Forest Insects and Diseases	22.5

2014 Forestry

Mississippi Department of Education

Program CIP: 03.0511 – Forestry Technology/Technician

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The Research and Curriculum Unit (RCU), located in Starkville, MS, as part of Mississippi State University, was established to foster educational enhancements and innovations. In keeping with the land grant mission of Mississippi State University, the RCU is dedicated to improving the quality of life for Mississippians. The RCU enhances intellectual and professional development of Mississippi students and educators while applying knowledge and educational research to the lives of the people of the state. The RCU works within the contexts of curriculum development and revision, research, assessment, professional development, and industrial training.

Preface

Secondary career and technical education programs in Mississippi face many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act IV, 2007; and No Child Left Behind Act of 2001).

Pathway Description

Forestry is an instructional program designed to prepare students to enter occupations related to the field of forestry. The first year topics include Exploring the World of Forestry, Leadership/FFA Activities, Forest Safety, Tree Growth and Stand Development, Dendrology, Forest Surveying and Mapping, Legal Land Descriptions, Tree and Log Measurements, and Introduction to Timber Cruising. The second year instruction focuses on Identifying Forests and Forest Products, Employability Skills/FFA Activities, Forest Management Practices, Advanced Timber Cruising, Timber Marketing, Timber Harvesting, Reforestation, Forest Fire Management, and Forest Insects and Diseases. Graduates may become employed at the entry level or pursue careers in Forestry, Agriculture, Agribusiness, or Natural Resources Education in postsecondary or higher education.

Industry Certification

Competencies and suggested performance indicators in the Forestry course have been correlated to the National Agriculture, Food, and Natural Resources (AFNR) Career Cluster Content. Standards that have been reviewed and endorsed at the national level by the National Council on Agricultural Education.

Assessment

The latest assessment blueprint for the curriculum can be found at

http://www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

If there are questions regarding assessment of this program, please contact the Research and Curriculum Unit at 662.325.2510.

Student Prerequisites

In order for students to be able to experience success in the Forestry program, the following student prerequisites are suggested:

1. C or higher in English (the previous year)
2. C or higher in Math (last course taken or the instructor can specify the math)
3. Instructor Approval and TABE Reading Score (eighth grade or higher)

or

1. TABE Reading Score (eighth grade or higher)
2. Instructor Approval

or

1. Instructor Approval

Applied Academic Credit

Content of the Forestry course has been aligned to the 2010 Mississippi Science Curriculum Framework. Students who successfully complete the first and second year Forestry curriculum will receive two elective science credits that will count toward high school science graduation requirements.

Teacher Licensure

The latest teacher licensure information can be found at

http://www.mde.k12.ms.us/educator-licensure

Professional Learning

If you have specific questions about the content of any of training sessions provided, please contact the Research and Curriculum Unit at 662.325.2510 and ask for a professional-learning specialist.

Option 1—Four One-Carnegie-Unit Courses

This curriculum consists of four one-credit courses, which should be completed in the following sequence:

1. **Forestry Introduction—Course Code: 991502**
2. **Forestry Surveying and Measurements—Course Code: 991503**
3. **Forestry Cruising—Course Code: 991504**
4. **Forestry Marketing—Course Code: 991505**

Course Description: Forestry Introduction

The forestry introduction course provides the building blocks for knowledge and understanding in forestry. Students will cover topics such as the FFA, leadership skills, safety, and dendrology. Additionally, students will cover forest surveying and mapping techniques necessary for the next course offering.

Course Description: Forestry Surveying and Measurements

The forestry surveying and measurements course offers insight into the world of legal documents used in forestry. Student will be well versed in the use of legal land description as well as how to perform tree and log calculations. Students will also be introduced to timber cruising activities.

Course Description: Forestry Cruising

The forestry cruising course will examine more deeply timber cruise practices. Students will also be exposed to employability skills and career opportunities in forestry. Additional topics include forest types, forest products, and forest management techniques.

Course Description: Forestry Marketing

The forestry marketing course delivers information about timber harvesting, sales, and reforestation techniques. Additionally students will be exposed to fire management and safety as well as common insect and disease problems encountered in forestry.

Forestry Introduction—Course Code: 991502

Unit	Unit Name	Hours
1	Exploring the World of Forestry	7.5
2	Leadership/FFA Activities	7.5
3	Forest Safety	15
4	Tree Growth and Stand Development	7.5
5	Dendrology	30
6	Forest Surveying and Mapping	37.5
Total		105

Forestry Surveying and Measurements—Course Code: 991503

Unit	Unit Name	Hours
7	Legal Land Descriptions	30
8	Tree and Log Measurements	37.5
9	Introduction to Timber Cruising	45
Total		112.5

Forestry Cruising—Course Code: 991504

Unit	Unit Name	Hours
10	Identifying Forests and Forest Products	7.5
11	Employability Skills/FFA Activities	7.5
12	Forest Management Practices	45
13	Advanced Timber Cruising	52.5
Total		112.5

Forestry Marketing—Course Code: 991505

Unit	Unit Name	Hours
14	Timber Marketing	15
15	Timber Harvesting	15
16	Reforestation	22.5
17	Forest Fire Management	22.5
18	Forest Insects and Diseases	22.5
Total		97.5

Option 2—Two Two-Carnegie-Unit Courses

This curriculum consists of two two-credit courses, which should be completed in the following sequence:

1. **Forestry I—Course Code: 991500**
2. **Forestry II—Course Code: 991501**

Course Description: Forestry I

Forestry I is designed to introduce the student to the forest industry and forestry careers in Mississippi. The course provides instruction on forest careers and leadership, forest safety, tree growth and development, dendrology, surveying and mapping, and tree and log measurements. Emphasis is placed on the scientific and technical principles of modern forest management.

Course Description: Forestry II

Forestry II is a continuation of Forestry I with additional emphasis on forest management, timber cruising, marketing and harvesting methods, reforestation, fire management, and forest pests. Emphasis is placed on scientific and technical principles.

Forestry I—Course Code: 991500

Unit	Unit Name	Hours
1	Exploring the World of Forestry	7.5
2	Leadership/FFA Activities	7.5
3	Forest Safety	15
4	Tree Growth and Stand Development	7.5
5	Dendrology	30
6	Forest Surveying and Mapping	37.5
7	Legal Land Descriptions	30
8	Tree and Log Measurements	37.5
9	Introduction to Timber Cruising	45
Total		217.5

Forestry II—Course Code: 991501

Unit	Unit Name	Hours
10	Identifying Forests and Forest Products	7.5
11	Employability Skills/FFA Activities	7.5
12	Forest Management Practices	45
13	Advanced Timber Cruising	52.5
14	Timber Marketing	15
15	Timber Harvesting	15
16	Reforestation	22.5
17	Forest Fire Management	22.5
18	Forest Insects and Diseases	22.5
Total		210

Installation and Service: HVAC

Program CIP: 47.0201

Ordering Information

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Acknowledgments

The Installation and Service curriculum was presented to the Mississippi Board of Education on January 16, 2009. The following persons were serving on the state board at the time:

Mr. Charles McClelland, Chair
Dr. O. Wayne Gann, Vice-Chair
Mr. William Harold Jones
Ms. Kami Bumgarner
Mr. Howell "Hal" N. Gage
Mr. Claude Hartley
Dr. Sue Matheson
Mrs. Martha "Jackie" Murphy
Ms. Rosetta Richards
Dr. Tom Burnham, State Superintendent of Education

Jean Massey, Associate State Superintendent of Education for the Office of Vocational Education and Workforce Development, at the Mississippi Department of Education assembled an oversight committee to provide input throughout the development of the *Construction Technology Curriculum Framework and Supporting Materials.* Members of this task force were as follows:

Blake Alexander, Mississippi ABC
Tammy Ates, Hinds Community College
Gary Bambauer, Mississippi Construction Education Foundation
Mike Barkett, Mississippi Construction Education Foundation
Lane Bell, Tippah County Career Technical Center
Preston Brownlow, Leflore County Career Technical Center
Dale Box, Greene County Career Technical Center
Johnny Browder, Hinds Community College
Tom Catchings, McComb Technology Center
Nick Doles, Calhoun County Vocational/Technical Center
Doug Ferguson, Research and Curriculum Unit
Melvin Glass, Tunica County Career Technical Center
Steve Hurdle, Oxford/Lafayette Career Technical Center
Reggie Ladner, Hancock County Vocational/Technical Center
Charles Lurie, Pascagoula Applied Technology Center
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Jean Massey, Mississippi Department of Education
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Diane Novak, Jackson County Technical Center
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Andy Sims, Mississippi Department of Education
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Will Tolliver, Mississippi Delta Community College
Tim Wigginton, Tupelo School District

Mike Zarolinski, Pascagoula Applied Technology Center

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Lee Dell Buck, Claiborne County Vocational Center, Port Gibson
Eddie Jackson, Pontotoc Ridge Career and Technical Center, New Albany
Ralph James, Laurel High School Vocational Center, Laurel
Dennis Pounds, Carl Lofton Vocational Complex, Foxworth
Jacob Green, Pascagoula Applied Technology Center, Pascagoula
David Grant, Mississippi Delta Community College, Moorhead
Kenny Jobe, Mississippi Delta Community College, Moorhead
Marvin Moak, Hinds Community College, Raymond

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Andy Sims, Program Coordinator, Office of Vocational Education and Workforce Development, Mississippi Department of Education, Jackson, MS

Finally, standards in the *Installation and Service Curriculum Framework and Supporting Materials* are based on the following:

Contren Learning Series from the National Center for Construction Education and Research

Applied Academic Credit Benchmarks

Mississippi Department of Education 2007 Mississippi Mathematics Framework Revised

21st Century Skills and Information and Communication Technologies Literacy Standards

In defining 21st century learning, the Partnership for 21st Century Skills has embraced five content and skill areas that represent the essential knowledge for the 21st century: Global awareness; civic engagement; financial, economic, and business literacy; learning skills that encompass problem-solving, critical-thinking, and self-directional skills; and Information and Communication Technology (ICT) literacy.

National Educational Technology Standards for Students

ACT College Readiness Standards

~~The College Readiness Standards are sets of statements intended to help students understand what is expected of them in preparation for the ACT. These standards are integrated into teaching and assessment strategies throughout the curriculum framework.~~

~~Preface~~

~~Secondary vocational–technical education programs in Mississippi are faced with many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.~~

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Installation and Service: Heating, Ventilation, and Air-Conditioning (HVAC) Executive Summary

Program Description

The Installation and Service: HVAC concentration is an instructional program that prepares students for employment or continued education in the occupations of heating, ventilation, and air-conditioning. The curriculum framework for this program was developed in partnership with the Mississippi Construction Education Foundation (MCEF). MCEF is the accredited sponsor for the National Center for Construction Education and Research (NCCER).

Industry Certification

The NCCER developed and published a set of industry standards that are taught nationwide by contractors, associations, construction users, and secondary and postsecondary schools called the **Contren Learning Series.** When developing this set of standards, the NCCER assembled a team of subject matter experts that represented construction companies and schools across the nation. Each committee met several times and combined experts' knowledge and experience to finalize the set of national industry standards.

As a part of the accreditation process, all Mississippi Construction Technology instructors will be required to successfully complete the **Instructor Certification Training Program**. This program ensures that instructors possess a deep knowledge of content of the standards.

This state-of-the-art curriculum is modeled after the eight Mississippi **NCCER Accredited Training and Education Facilities (ATEF)**. In order to become an NCCER ATEF program, school districts must meet a set of guidelines including the following:

1. Use the approved curriculum.
2. All instructors must be NCCER certified.
3. All completed Form 200s and release forms on all student completions are to be forwarded to MCEF for proper approval. MCEF will in turn forward to NCCER for processing.
4. Follow NCCER guidelines on test security and performance profiles.
5. Have an active advisory committee with at least two commercial contractors involved.
6. Follow safety practices and Occupational Safety and Health Administration (OSHA) standards used in the class and lab areas.
7. Involve commercial contractors in class presentations or field trips.
8. All construction programs must be included in the accreditation process.
9. Show active involvement in student leadership development (e.g., VICA and SkillsUSA).
10. Provide demonstrated placement into construction-related occupations, and provide timely reports to MCEF.

Districts will be required to complete a self-evaluation of all programs and host a site visit from industry to ensure proper lab, safety, and instructional procedures are in place.

Assessment

Students will be assessed using the Installation and Service: HVAC MS-CPAS2 test. The MS-CPAS2 blueprint can be found at http://info.rcu.msstate.edu/services/curriculum.asp. If there are questions regarding assessment of this program, please contact the Construction and Manufacturing instructional design specialists at the Research and Curriculum Unit at 662.325.2510.

Student Prerequisites

In order for students to be successful in the Installation and Service: HVAC program, the following student prerequisites are in place:

4. C or higher in English (the previous year)
5. C or higher in Math (last course taken or the instructor can specify the math)

or

6. Instructor Approval and TABE Reading Score (eighth grade or higher)

or

7. Instructor Approval

Proposed Applied Academic Credit

Applied Math content from the curriculum was aligned to the 2007 Mississippi Math Framework Revised Academic Benchmarks. It is proposed that upon the completion of this program, students will earn 1/2 Applied Math credit that can be used for graduation requirements.

The applied academic credit has ***not*** been approved by the Mississippi Commission on School Accreditation or by the State Board of Education. If there are questions regarding applied academic credit, please contact the Coordinator of Workforce Education at the Research and Curriculum Unit at 662.325.2510.

Licensure Requirements

A 974 educator license is required to teach the Installation and Service: HVAC concentration program. Requirements for the 974 endorsement are listed below:

1. Applicant must hold a 2-year college degree (associate's degree) or higher from an accredited institution of higher education.
2. Applicant with an associate's degree must have at least 2 years of verifiable occupational experience in the past 10 years. Experience must be appropriate to the subject to be taught. Applicant with a bachelor's or higher degree must have at least 1 year of verifiable occupational experience in the past 10 years. Experience must be appropriate to the subject to be taught.
3. Applicant must enroll immediately in the Vocational Instructor Preparation (VIP) or the Redesign Education Program (REP).
4. Applicant must complete the individualized Professional Development Plan (PDP) requirements of the VIP or REP prior to the expiration date of the 3-year vocational license.
5. Applicant must earn a passing score on Heating, Ventilation, and Air-Conditioning assessment from National Craft Assessment and Certification Program.
6. Applicant must successfully complete the Contren Instructor Certification.
7. Applicant must successfully complete an MDE-approved computer literacy certification exam.
8. Applicant must successfully complete certification for an online learning workshop, module, or course that is approved by the MDE.
9. Applicant must successfully complete the Installation and Service: HVAC certification workshop, module, or course that is approved by the MDE.

Note: If the applicant meets all requirements listed above, that applicant will be issued a 974 endorsement – a 5-year license. If the applicant does not meet **all** requirements, the applicant will

be issued a 3-year endorsement (license), and all requirements stated above must be satisfied prior to the ending date of that license.

Professional Learning

The professional learning itinerary for the middle school or individual pathways can be found at http://redesign.rcu.msstate.edu. If you have specific questions about the content of each training session provided, please contact the Research and Curriculum Unit at 662.325.2510, and ask for the Professional Learning Specialist.

Course Outlines

This curriculum framework allows options for local school districts to implement based on student needs and scheduling demands. This curriculum offers a four-Carnegie-unit program.

Option 1

Upon completion of this option, the student will be trained to take the **NCCER Core Level 1 Certification and HVAC Level 1 Certification** exams. This curriculum consists of four one-credit courses, which should be completed in the following sequence:

Installation and Service I (Course Code: 993002)
Installation and Service II (Course Code: 993003)
Beginning HVAC (Course Code: 993022)
Advanced HVAC (Course Code: 993023)

Course Description: Installation and Service I (Course Code: 993002) includes an introduction to the field as well as fundamentals of safety, math, blueprint reading, and hand and power tools. This is a one-Carnegie-unit course.

Course Description: Installation and Service II (Course Code: 993003) emphasizes an overview of safety and leadership, the lathe theory, and grinding operations. This course gives students real-world, hands-on practice in these areas. This one-Carnegie-unit course should only be taken after students successfully pass Installation and Service, Part A.

Course Description: Beginning HVAC (Course Code: 993022) includes an in-depth study of the heating, ventilation, and air-conditioning profession, HVAC math, ferrous metal piping practice, introduction to cooling, and introduction to heating. This course also reinforces safety related to the installation and service of HVAC applications. This one-Carnegie-unit course should only be taken after students successfully pass Installation and Service, Part B.

Course Description: Advanced HVAC (Course Code: 993023) includes an in-depth study of the heating, ventilation, and air conditioning profession, air distribution systems, leak detection evacuation recovery and charging, alternating current, and basic electronics. This course also reinforces safety related to the installation and service of HVAC applications. This one-Carnegie-unit course should only be taken after students successfully pass Installation and Service II – HVAC, Part A.

- Scheduling and operating more than one course in the same classroom/laboratory with the same instructor is not allowed.
- Safety will be reinforced and tested at the beginning of each course.
- Students must complete installation and service courses with a score of 80/C or higher in classwork to advance to the next level.

~~Installation and Service I (Course Code: 993002)~~

~~Unit~~		~~Title~~	~~Hours~~
~~1~~		~~Orientation and Safety~~	~~50~~
~~2~~		~~Math, Introduction to Blueprints, and Hand and Power Tools~~	~~90~~
			~~140~~

~~Installation and Service II (Course Code: 993003)~~

~~Unit~~		~~Title~~	~~Hours~~
~~3~~		~~Orientation to the Trade, Tools of the Trade, Fasteners and Anchors, and Oxy-Fuel Cutting (IM)~~	~~70~~
~~4~~		~~Introduction to HVAC, Tools of the Trade (HVAC), Copper and Plastic Piping, Soldering and Brazing, and Basic Electricity (IM)~~	~~70~~
			~~140~~

~~Beginning HVAC (Course Code: 993022)~~

~~Unit~~		~~Title~~	~~Hours~~
~~5~~		~~Orientation and Safety (Review and Reinforcement)~~	~~20~~
~~6~~		~~Trade Math, Ferrous Metal Piping Practice, Introduction to Cooling, and Introduction to Heating~~	~~120~~
			~~140~~

~~Advanced HVAC (Course Code: 993023)~~

~~Unit~~		~~Title~~	~~Hours~~
~~7~~		~~Air Distribution Systems, Leak Detection Evacuation Recovery and Charging, Alternating Current, and Basic Electronics~~	~~140~~
			~~140~~

Option 2

Course Description: Installation and Service is a course that students learn about Heating, Ventilation, and Air-Conditioning. Topics include Math, Introduction to Blueprints, Hand and Power Tools, Orientation to the Trade, and Introduction to HVAC. This is a two-Carnegie-unit course.

- Scheduling and operating more than one course in the same classroom/laboratory with the same instructor is not allowed.
- Safety will be reinforced and tested at the beginning of each course.

Course Description: Heating, Ventilation and Air-Conditioning-HVAC is a continuation with the emphasis on Heating, Ventilation, and Air-Conditioning. Topics include employability skills, safety, ferrous metal piping, introduction to cooling, introduction to heating, air distribution, leak detection evacuation recovery and charging, alternating current, and basic electronics. The course should be taken after the student has successfully passed Installation and Service I. This is a two-Carnegie-unit course.

- Scheduling and operating more than one course in the same classroom/laboratory with the same instructor is not allowed.
- Safety will be reinforced and tested at the beginning of each course.
- Students must complete manufacturing trade courses with a score of 80/C or higher in classwork to advance to the next level.

Installation and Service (Course Code: 993001)

Unit		Title	Hours
1		Orientation and Safety	45
2		Math, Introduction to Blueprints, and Hand and Power Tools	85
3		Orientation to the Trade, Tools of the Trade, Fasteners and Anchors, and Oxy-Fuel Cutting (IM)	75
4		Introduction to HVAC, Tools of the Trade (HVAC), Copper and Plastic Piping, Soldering and Brazing, and Basic Electricity (IM)	75
			280

Heating, Ventilation and Air-Conditioning-HVAC (Course Code: 993021)

Unit		Title	Hours
5		Orientation and Safety (Review and Reinforcement)	5
6		Trade Math, Ferrous Metal Piping Practice, Introduction to Cooling, and Introduction to Heating	140
7		Air Distribution Systems, Leak Detection Evacuation Recovery and Charging, Alternating Current, and Basic Electronics	135
			280

Industrial Maintenance

Program CIP: 47.0303 Industrial Maintenance

Ordering Information

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Robin Parker, EdD, Curriculum Coordinator
Jolanda Harris, Educational Technologist

The Research and Curriculum Unit (RCU), located in Starkville, MS, as part of Mississippi State University, was established to foster educational enhancements and innovations. In keeping with the land grant mission of Mississippi State University, the RCU is dedicated to improving the quality of life for Mississippians. The RCU enhances intellectual and professional development of Mississippi students and educators while applying knowledge and educational research to the lives of the people of the state. The RCU works within the contexts of curriculum development and revision, research, assessment, professional development, and industrial training.

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Acknowledgments

The Installation and Service curriculum was presented to the Mississippi Board of Education on January 16, 2009. The following persons were serving on the state board at the time:

Mr. Charles McClelland, Chair
Dr. O. Wayne Gann, Vice-Chair
Mr. William Harold Jones
Ms. Kami Bumgarner
Mr. Howell "Hal" N. Gage
Mr. Claude Hartley
Dr. Sue Matheson
Mrs. Martha "Jackie" Murphy
Ms. Rosetta Richards
Dr. Tom Burnham, State Superintendent of Education

Jean Massey, Associate State Superintendent of Education for the Office of Vocational Education and Workforce Development, at the Mississippi Department of Education assembled an oversight committee to provide input throughout the development of the *Construction Technology Curriculum Framework and Supporting Materials.* Members of this task force were as follows:

Blake Alexander, Mississippi ABC
Tammy Ates, Hinds Community College
Gary Bambauer, Mississippi Construction Education Foundation
Mike Barkett, Mississippi Construction Education Foundation
Lane Bell, Tippah County Career Technical Center
Preston Brownlow, Leflore County Career Technical Center
Dale Box, Greene County Career Technical Center
Johnny Browder, Hinds Community College
Tom Catchings, McComb Technology Center
Nick Doles, Calhoun County Vocational/Technical Center
Doug Ferguson, Research and Curriculum Unit
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Reggie Ladner, Hancock County Vocational/Technical Center
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Marvin Moak, Hinds Community College, Raymond

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Andy Sims, Program Coordinator, Office of Vocational Education and Workforce Development, Mississippi Department of Education, Jackson, MS

Finally, standards in the *Installation and Service Curriculum Framework and Supporting Materials* are based on the following:

Contren Learning Series from the National Center for Construction Education and Research
Reprinted with permission from Contren Learning Series, Copyright © 2008, National Center for Construction Education and Research, (352) 334-0920, http://www.nccer.org/index.asp

Applied Academic Credit Benchmarks
Mississippi Department of Education 2007 Mississippi Mathematics Framework Revised

21st Century Skills and Information and Communication Technologies Literacy Standards
In defining 21st century learning, the Partnership for 21st Century Skills has embraced five content and skill areas that represent the essential knowledge for the 21st century: Global awareness; civic engagement; financial, economic, and business literacy; learning skills that encompass problem-solving, critical-thinking, and self-directional skills; and Information and Communication Technology (ICT) literacy.

National Educational Technology Standards for Students
Reprinted with permission from *National Educational Technology Standards for Students: Connecting Curriculum and Technology*, Copyright © 2007, ISTE (International Society for Technology in Education), (800) 336-5191 (U.S. and Canada) or (541) 302-3777 (International), iste@iste.org, www.iste.org. All rights reserved. Permission does not constitute an endorsement by ISTE.

ACT College Readiness Standards

The College Readiness Standards are sets of statements intended to help students understand what is expected of them in preparation for the ACT. These standards are integrated into teaching and assessment strategies throughout the curriculum framework.

~~Preface~~

~~Secondary vocational–technical education programs in Mississippi are faced with many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.~~

~~The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act IV, 2007; and No Child Left Behind Act of 2001).~~

Research Synopsis

By implementing the National Center for Construction Education and Research in the construction skills standards to the Installation and Service Pathway, students who successfully master the curriculum should have the skills required to enter the workforce or pursue an advanced degree. These skills are based on industry-validated performance indicators. The pathway will include applied instruction designed to articulate with programs offered in Mississippi's community and junior colleges.

Industry Job Data – Employment Projections 2006 to 2016

Note: Compiled by Mississippi Department of Employment Security and Labor Market Information Department

Occupational Title	Employment 2006	Projected Employment 2016	Change 2006–16	
			Number	Percent
Industrial Machinery Mechanics and Maintenance Workers	345,000	368,000	23,000	7%
Industrial Machinery Mechanics	261,000	284,000	24,000	9%
Maintenance and Repair Workers, General	1,391,000	1,513,000	140,000	10%

Industry Comments and Quotes

- A survey of industry representatives provided insight into skills needed for students completing the Installation and Service Pathway.
- Many employers have training programs available to allow employees to advance.
- The expectations of employers primarily center on employability or "soft" skills. Many indicated that dependability is a prime need for employment.
- Employers expect employees to have integrity, a strong work ethic, a good attitude, and customer service skills. They expect employees to be punctual, willing to stick with the job, able to prioritize and organize, and interested in helping people. Maturity level is the key concern.
- Employees should have skills related to safety, blueprints, hand and power tools, and math and measuring.
- Students should be exposed to the general idea of how mechanical, electrical, and hydraulic systems work together to form a complete machine but should also have specialized skills in specific areas such as heating ventilation and air-conditioning.
- Modify Installation and Service to have a year of fundamentals and basic industrial maintenance and HVAC techniques and a year of specialization in a specific area.
- Retain the 2-year individual programs to include fundamentals and a specialized area to include Industrial Maintenance Technician and Heating, Ventilation, and Air-Conditioning.

Course Outlines

This curriculum framework allows options for local school districts to implement based on student needs and scheduling demands. This curriculum offers a four-Carnegie-unit program.

Option 1

Upon completion of this option, the student will be trained to take the **NCCER Level 1 Certification and Industrial Maintenance Level 1 certification** exams. This curriculum consists of four one-credit courses, which should be completed in the following sequence:

Installation and Service I (Course Code: 993002)
Installation and Service I (Course Code: 993003)
Beginning Industrial Maintenance (Course Code: 993012)
Advanced Industrial Maintenance (Course Code: 993013)

Course Description: Installation and Service I (Course Code: 993002) includes an introduction to the field as well as fundamentals of safety, math, blueprint reading, hand and power tools. This is a one-Carnegie-unit course.

Course Description: Installation and Service II (Course Code: 993003) emphasizes an overview of safety and leadership, Introduction to HVAC. This course gives student's real-world, hands-on practice in these areas. This one-Carnegie-unit course should only be taken after students successfully pass Installation and Service, Part A.

Course Description: Beginning Industrial Maintenance (Course Code: 993012) includes an in-depth study of the industrial maintenance profession, maintenance tools, types of fasteners and anchors used in the maintenance field, gaskets and packing, pumps and pump drivers, types of valves, machine lubrication, and welding. This course also reinforces safety related to the industrial maintenance industry. This one-Carnegie-unit course should only be taken after students successfully pass Installation and Service, Part B.

Course Description: Advanced Industrial Maintenance (Course Code: 993013) includes an in-depth study of test equipment, material handling and rigging, and mobile and support equipment, National Electrical Code, electrical theory, conductor terminations and splices, and hydraulic and pneumatic controls. This course also reinforces safety related to the industrial maintenance industry. This one-Carnegie-unit course should only be taken after students successfully pass Installation and Service II – Industrial Maintenance, Part A.

- Safety will be reinforced and tested at the beginning of each course.
- Students must complete installation and service courses with a score of 80/C or higher in class work to advance to the next level.

~~Installation and Service I (Course Code: 993002)~~

~~Unit~~		~~Title~~	~~Hours~~
~~1~~		~~Orientation and Safety~~	~~50~~
~~2~~		~~Math, Introduction to Blueprints, and Hand and Power Tools~~	~~90~~
			~~**140**~~

~~Installation and Service II (Course Code: 993003)~~

~~Unit~~		~~Title~~	~~Hours~~
~~3~~		~~Orientation to the Trade, Tools of the Trade, Fasteners and Anchors, and Oxy-Fuel Cutting (IM)~~	~~70~~
~~4~~		~~Introduction to HVAC, Tools of the Trade (HVAC), Copper and Plastic Piping, Soldering and Brazing, and Basic Electricity (IM)~~	~~70~~
			~~**140**~~

~~Beginning Industrial Maintenance (Course Code: 993012)~~

~~Unit~~		~~Title~~	~~Hours~~
~~5~~		~~Orientation and Safety (Review and Reinforcement)~~	~~25~~
~~6~~		~~Gaskets and Packing, Pumps and Drivers, Introduction to Valves, Lubrication, and Welding~~	~~115~~
			~~**140**~~

~~Advanced Industrial Maintenance (Course Code: 993013)~~

~~Unit~~		~~Title~~	~~Hours~~
~~7~~		~~Related Construction Math, Construction Drawings, Introduction to Test Equipment, Material Handling and Rigging, and Mobile and Support Equipment~~	~~70~~
~~8~~		~~Introduction to the National Electrical Code, Electrical Theory, Conductor Terminations and Splices, and Hydraulic and Pneumatic Controls~~	~~70~~
			~~**140**~~

Option 2

Course Description: Installation and Service includes orientation and leadership; basic safety; math, measuring tools, and instruments; blueprints; hand and power tools; introduction to industrial maintenance; and heating, ventilation, and air-conditioning. Safety is emphasized in each unit and every activity.

Course Description: Industrial Maintenance is a continuation with the emphasis on industrial maintenance. Topics include employability skills, safety, gaskets, packing, pumps, drivers, valves, lubrication, test equipment, material handling, national electrical code, conductor termination, hydraulics, and pneumatics. The course should be taken after the student has successfully passed Installation and Service I.

- Scheduling and operating more than one course in the same classroom/laboratory with the same teacher is not allowed.
- Safety will be reinforced and tested at the beginning of each course.
- Students must complete installation and service courses with a score of 80/C or higher in class work to advance to the next level.

Installation and Service (Course Code: 993001)

Unit		Title	Hours
1		Orientation and Safety	45
2		Math, Introduction to Blueprints, and Hand and Power Tools	85
3		Orientation to the Trade, Tools of the Trade, Fasteners and Anchors, and Oxy-Fuel Cutting (IM)	75
4		Introduction to HVAC, Tools of the Trade (HVAC), Copper and Plastic Piping, Soldering and Brazing, and Basic Electricity (IM)	75
			280

Industrial Maintenance (Course Code: 993011)

Unit		Title	Hours
5		Orientation and Safety (Review and Reinforcement)	5
6		Gaskets and Packing, Pumps and Drivers, Introduction to Valves, Lubrication, and Welding	105
7		Related Construction Math, Construction Drawings, Introduction to Test Equipment, Material Handling and Rigging, and Mobile and Support Equipment	85
8		Introduction to the National Electrical Code, Electrical Theory, Conductor Terminations and Splices, and Hydraulic and Pneumatic Controls	85
			280

2014 Installation and Service (Core)

Mississippi Department of Education

Program CIP: 47.0000 - Mechanics and Repairers, General

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The Research and Curriculum Unit (RCU), located in Starkville, MS, as part of Mississippi State University, was established to foster educational enhancements and innovations. In keeping with the land grant mission of Mississippi State University, the RCU is dedicated to improving the quality of life for Mississippians. The RCU enhances intellectual and professional development of Mississippi students and educators while applying knowledge and educational research to the lives of the people of the state. The RCU works within the contexts of curriculum development and revision, research, assessment, professional development, and industrial training.

Preface

Secondary career and technical education programs in Mississippi face many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act IV, 2007; and No Child Left Behind Act of 2001).

Pathway Description

The Installation and Service Core instructional program provides a foundation of knowledge to prepare students for employment or continued education in several occupations related to the manufacturing and construction industry. The curriculum framework for this program was developed in partnership with the Mississippi Construction Education Foundation (MCEF). MCEF is the accredited sponsor for the National Center for Construction Education and Research (NCCER).

When developing this curriculum, the authors recognized the importance of incorporating differentiated instruction and the needs of the 21st-century learners. Therefore, teaching strategies include a blend of online and face-to-face instruction that align with NCCER Connect e-books, online lectures, video presentations, online quizzes, active figures, and Spanish content. Students will have access to this information to learn new content as well as to review, reinforce, or revise their work.

Industry Certification

The NCCER published the ***Learning Series*** as the set of industry standards that should be taught nationwide by contractors, associations, and secondary and postsecondary schools**.** To develop the *Learning Series*, the NCCER assembled a team of subject-matter experts that represented construction and manufacturing companies and schools across the nation. Each committee met several times, combining experts' knowledge and experience to finalize the benchmarks and requirements included in the standards.

As a part of the certification process, all Mississippi manufacturing and construction pathway instructors will be required to successfully complete the **Instructor Certification Training**

Program. Doing so ensures that instructors possess the necessary comprehensive knowledge and understanding of the standards.

This state-of-the-art curriculum is modeled after the Mississippi **NCCER Accredited Training and Education Facilities (ATEF)**. In order to become an NCCER ATEF program, school districts must meet the following set of requirements:

1. Use the approved curriculum.
2. All instructors must be NCCER certified.
3. All completed Form 200s and release forms on all student completions are to be forwarded to MCEF for proper approval. MCEF will in turn forward to NCCER for processing.
4. Follow NCCER guidelines on test security and performance profiles.
5. Have an active advisory committee with at least two commercial contractors involved.
6. Follow safety practices and Occupational Safety and Health Administration (OSHA) standards in the class and lab areas.
7. Involve commercial contractors in class presentations or field trips.
8. All manufacturing programs must be included in the accreditation process.
9. Show active involvement in student leadership development (SkillsUSA).
10. Provide demonstrated placement into construction and manufacturing-related occupations, and provide timely reports to MCEF.
11. Districts will be required to complete a self-evaluation of all programs and host a site visit for a representative from industry to ensure that proper lab, safety, and instructional procedures are in place.

Assessment

The latest assessment blueprint for the curriculum can be found at

http://www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Student Prerequisites

In order for students to be successful in the Installation and Service program, the following student prerequisites are suggested:

1. C or higher in English (the previous year)
2. C or higher in Math (last course taken or the instructor can specify the math)

   or

3. Instructor Approval and TABE Reading Score (eighth grade or higher)

   or

4. Instructor Approval

Teacher Licensure

The latest teacher licensure information can be found at

http://www.mde.k12.ms.us/educator-licensure

Professional Learning

If you have specific questions about the content of any of training sessions provided, please contact the Research and Curriculum Unit at 662.325.2510 and ask for a professional-learning specialist.

Curriculum Framework Sequence

To complete the pathway students must complete 4 Carnegie Credits.

CORE - 2 Carnegie Credits:

Installation and Service (Core)

Subsequent Local Specialization - 2 Carnegie credits:

Industrial Maintenance

Or

HVAC

Should additional options be developed they will be located on the RCU download page.
www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Option 1—Two, One-Carnegie-Unit Courses

Upon completion of this option, the student will be eligible to take the **NCCER Core Level 1 Certification** exam.

This curriculum consists of two, one-credit courses, which must be completed in the following sequence:

1. **Installation and Service I —Course Code: 993002**
2. **Installation and Service II—Course Code: 993003**

Course Description: Installation and Service I

Installation and Service I includes an introduction to the field as well as fundamentals of safety, math, and hand and power tools. This is a one-Carnegie-unit course.

Course Description: Installation and Service II

Installation and Service II provides an introduction to blueprints, materials handling, orientation to the trade, tools of the trade (IM), fasteners and anchors, and oxy-fuel cutting, introduction to HVAC, tools of the trade (HVAC), copper and plastic piping, soldering and brazing, and basic electricity (HVAC). This course gives students real-world, hands-on practice in these areas. This one-Carnegie-unit course should only be taken after students successfully pass Installation and Service I.

- Scheduling and operating more than one course in the same classroom/laboratory with the same instructor is not allowed.
- Safety will be reinforced and tested at the beginning of each course.
- Students must complete installation and service core with a score of 80/C or higher in classwork to advance to the next level.

Installation and Service I—Course Code: 993002

Unit		Title	Hours
1		Introduction and Orientation	25
2		Basic Safety	35
3		Basic Math	40
4		Hand and Power Tools	40
			140

Installation and Service II—Course Code: 993003

Unit		Title	Hours
5		Introduction to Blueprints	24
6		Introduction to Materials Handling	24
7		Orientation to the Trade, Tools of the Trade, Fasteners and Anchors, and Oxy-Fuel Cutting (IM)	46
8		Introduction to HVAC, Tools of the Trade (HVAC), Copper and Plastic Piping, Soldering and Brazing, and Basic Electricity (HVAC)	46
			140

Option 2—One, Two-Carnegie-Unit Course

Upon completion of this option, the student will be eligible to take the **NCCER Core Level 1 Certification** exam.

This curriculum consists of the following one, two-Carnegie-unit course:

1. **Installation and Service Core—Course Code: 993001**

Course Description: Installation and Service Core

The Installation and Service Core course introduces students to fundamentals of safety, tools, math, and blueprint reading, as well as materials handling, basic Industrial Maintenance and HVAC skills.

- Scheduling and operating more than one course in the same classroom/laboratory with the same instructor is not allowed.
- Safety will be reinforced and tested at the beginning of each course.
- Students must complete installation and service core with a score of 80/C or higher in classwork to advance to the next level.

Installation and Service Core—Course Code: 993001

Unit		Title	Hours
1		Introduction and Orientation	25
2		Basic Safety	35
3		Basic Math	40
4		Hand and Power Tools	40
5		Introduction to Blueprints	24
6		Introduction to Materials Handling	24
7		Orientation to the Trade, Tools of the Trade (IM), Fasteners and Anchors, and Oxy-Fuel Cutting (IM)	46
8		Introduction to HVAC, Tools of the Trade (HVAC), Copper and Plastic Piping, Soldering and Brazing, and Basic Electricity (HVAC)	46
			280

2014 HVAC

Mississippi Department of Education

Program CIP: 47.0201 Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology/Technician

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The Research and Curriculum Unit (RCU), located in Starkville, MS, as part of Mississippi State University, was established to foster educational enhancements and innovations. In keeping with the land grant mission of Mississippi State University, the RCU is dedicated to improving the quality of life for Mississippians. The RCU enhances intellectual and professional development of Mississippi students and educators while applying knowledge and educational research to the lives of the people of the state. The RCU works within the contexts of curriculum development and revision, research, assessment, professional development, and industrial training.

Preface

Secondary career and technical education programs in Mississippi face many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act IV, 2007; and No Child Left Behind Act of 2001).

Pathway Description

The HVAC pathway is a curriculum that provides an educational option for students who have successfully completed the Installation and Service Core (2 Carnegie credits). This option is an instructional program that prepares students for employment or continued education in the occupations of heating, ventilation, and air-conditioning. The curriculum framework for this program was developed in partnership with the Mississippi Construction Education Foundation (MCEF). MCEF is the accredited sponsor for the National Center for Construction Education and Research (NCCER).

Industry Certification

The NCCER developed and published a set of industry standards that are taught nationwide by contractors, associations, construction users, and secondary and postsecondary schools called the **NCCER Learning Series.** When developing this set of standards, the NCCER assembled a team of subject matter experts that represented construction companies and schools across the nation. Each committee met several times and combined experts' knowledge and experience to finalize the set of national industry standards.

As a part of the accreditation process, all Mississippi Construction Technology instructors will be required to successfully complete the **Instructor Certification Training Program**. This program ensures that instructors possess a deep knowledge of content of the standards.

This state-of-the-art curriculum is modeled after the eight Mississippi **NCCER Accredited Training and Education Facilities (ATEF)**. In order to become an NCCER ATEF program, school districts must meet a set of guidelines including the following:

1. Use the approved curriculum.
2. All instructors must be NCCER certified.
3. All completed Form 200s and release forms on all student completions are to be forwarded to MCEF for proper approval. MCEF will in turn forward to NCCER for processing.
4. Follow NCCER guidelines on test security and performance profiles.
5. Have an active advisory committee with at least two commercial contractors involved.
6. Follow safety practices and Occupational Safety and Health Administration (OSHA) standards used in the class and lab areas.
7. Involve commercial contractors in class presentations or field trips.
8. All construction programs must be included in the accreditation process.
9. Show active involvement in student leadership development (e.g., SkillsUSA).
10. Provide demonstrated placement into construction-related occupations, and provide timely reports to MCEF.

Districts will be required to complete a self-evaluation of all programs and host a site visit from industry to ensure proper lab, safety, and instructional procedures are in place.

Assessment

The latest assessment blueprint for the curriculum can be found at http://www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Student Prerequisites

In order for students to be able to experience success in the HVAC program, the following student prerequisites are suggested:

1. C or higher in English (the previous year)
2. C or higher in Math (last course taken or the instructor can specify the math)
3. Instructor Approval and TABE Reading Score (eighth grade or higher)

or

1. TABE Reading Score (eighth grade or higher)
2. Instructor Approval

or

1. Instructor Approval

Teacher Licensure

The latest teacher licensure information can be found at

http://www.mde.k12.ms.us/educator-licensure

Professional Learning

If you have specific questions about the content of any of training sessions provided, please contact the Research and Curriculum Unit at 662.325.2510 and ask for a professional-learning specialist.

Option 1—Two, One-Carnegie-Unit Courses

Upon completion of this option, the student will be prepared to take the **HVAC Level 1 Certification** exams. This curriculum consists of two, one-credit courses, which should be completed in the following sequence:

1. **Beginning HVAC—Course Code: 993022**
2. **Advanced HVAC—Course Code: 993023**

Course Description: Beginning HVAC

Beginning HVAC includes an in-depth study of the heating, ventilation, and air-conditioning profession, HVAC math, ferrous metal piping practice, introduction to cooling, and introduction to heating. This course also reinforces safety related to the installation and service of HVAC applications. This one-Carnegie-unit course should only be taken after students successfully complete Installation and Service Core.

Course Description: Advanced HVAC

Advanced HVAC includes an in-depth study of the heating, ventilation, and air conditioning profession, air distribution systems, leak detection evacuation recovery and charging, alternating current, and basic electronics. This course also reinforces safety related to the installation and service of HVAC applications. This one-Carnegie-unit course should only be taken after students successfully complete Beginning HVAC (course code 993022).

- Scheduling and operating more than one course in the same classroom/laboratory with the same instructor is not allowed.
- Safety will be reinforced and tested at the beginning of each course.

- Students must complete **Installation and Service Core** with a score of 80/C or higher in classwork to advance to the next level.

Beginning HVAC—Course Code: 993022

Unit		Title	Hours
1		Orientation and Safety (Review and Reinforcement)	20
2		Trade Math, Ferrous Metal Piping Practice,	60
3		Introduction to Cooling, and Introduction to Heating	60
			140

Advanced HVAC—Course Code: 993023

Unit		Title	Hours
4		Air Distribution Systems	40
5		Leak Detection Evacuation Recovery and Charging	60
6		Alternating Current and Basic Electronics	40
			140

Option 2—One, Two-Carnegie-Unit Courses

This curriculum consists of one, two-credit course, as follows:

1. **HVAC—Course Code: 993021**

Course Description: HVAC

HVAC (Heating, Ventilation and Air-Conditioning) is an emphasis on Heating, Ventilation, and Air-Conditioning. Topics include employability skills, safety, ferrous metal piping, introduction to cooling, introduction to heating, air distribution, leak detection evacuation recovery and charging, alternating current, and basic electronics. The course should be taken after the student has successfully completed Installation and Service Core.

- Scheduling and operating more than one course in the same classroom/laboratory with the same instructor is not allowed.
- Safety will be reinforced and tested at the beginning of each course.
- Students must complete **Installation and Service Core** with a score of 80/C or higher in classwork to advance to the next level.

Heating, Ventilation and Air-Conditioning-HVAC—Course Code: 993021

Unit		Title	Hours
1		Orientation and Safety (Review and Reinforcement)	20
2		Trade Math, Ferrous Metal Piping Practice	60
3		Introduction to Cooling, and Introduction to Heating	60
4		Air Distribution Systems	40
5		Leak Detection Evacuation Recovery and Charging	60
6		Alternating Current and Basic Electronics	40
			280

2014 Industrial Maintenance

Mississippi Department of Education

Program CIP: 47.0303 – Industrial Mechanics and Maintenance Technology

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Preface

Secondary career and technical education programs in Mississippi face many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act IV, 2007; and No Child Left Behind Act of 2001).

Pathway Description

The Industrial Maintenance pathway is a curriculum that provides an educational option for students who have successfully completed the Installation and Service Core (2 Carnegie units). This option is an instructional program that prepares students for employment or continued education in the occupations of installation, maintenance, and repair work. The curriculum framework for this program was developed in partnership with the Mississippi Construction Education Foundation (MCEF). MCEF is the accredited sponsor for the National Center for Construction Education and Research (NCCER).

Industry Certification

The NCCER developed and published a set of industry standards that are taught nationwide by contractors, associations, construction users, and secondary and postsecondary schools called the **NCCER Learning Series.** When developing this set of standards, the NCCER assembled a team of subject matter experts that represented construction companies and schools across the nation. Each committee met several times and combined experts' knowledge and experience to finalize the set of national industry standards.

As a part of the accreditation process, all Mississippi Manufacturing Technology instructors will be required to successfully complete the **Instructor Certification Training Program**. This program ensures that instructors possess a deep knowledge of content of the standards.

This state-of-the-art curriculum is modeled after the eight Mississippi **NCCER Accredited Training and Education Facilities (ATEF)**. In order to become an NCCER ATEF program, school districts must meet a set of guidelines including the following:

1. Use the approved curriculum.
2. All instructors must be NCCER certified.
3. All completed Form 200s and release forms on all student completions are to be forwarded to MCEF for proper approval. MCEF will in turn forward to NCCER for processing.
4. Follow NCCER guidelines on test security and performance profiles.
5. Have an active advisory committee with at least two commercial contractors involved.
6. Follow safety practices and Occupational Safety and Health Administration (OSHA) standards used in the class and lab areas.
7. Involve commercial contractors in class presentations or field trips.
8. All construction programs must be included in the accreditation process.
9. Show active involvement in student leadership development (e.g., VICA and SkillsUSA).
10. Provide demonstrated placement into construction-related occupations, and provide timely reports to MCEF.

Districts will be required to complete a self-evaluation of all programs and host a site visit from industry to ensure proper lab, safety, and instructional procedures are in place.

Assessment

The latest assessment blueprint for the curriculum can be found at http://www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Student Prerequisites

In order for students to be able to experience success in the Industrial Maintenance program, the following student prerequisites are suggested:

1. C or higher in English (the previous year)

2. C or higher in Math (last course taken or the instructor can specify the math)
3. Instructor Approval and TABE Reading Score (eighth grade or higher)

or

1. TABE Reading Score (eighth grade or higher)
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or

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Professional Learning

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Option 1—Two, One-Carnegie-Unit Courses

Upon completion of this option, the student will be prepared to take the **Industrial Maintenance Level 1 certification** exams. This curriculum consists of two one-credit courses, which should be completed in the following sequence:

1. **Beginning Industrial Maintenance—Course Code: 993012**
2. **Advanced Industrial Maintenance—Course Code: 993013**

Course Description: **Beginning Industrial Maintenance**

Beginning Industrial Maintenance (Course Code: 993012) includes an in-depth study of the industrial maintenance profession, maintenance tools, types of fasteners and anchors used in the maintenance field, gaskets and packing, pumps and pump drivers, types of valves, machine lubrication, and welding. This course also reinforces safety related to the industrial maintenance industry. This one-Carnegie-unit course should only be taken after students successfully pass Installation and Service Core.

Course Description: **Advanced Industrial Maintenance**

Advanced Industrial Maintenance (Course Code: 993013) includes an in-depth study of test equipment, material handling and rigging, and mobile and support equipment, National Electrical Code, electrical theory, conductor terminations and splices, and hydraulic and pneumatic controls. This course also reinforces safety related to the industrial maintenance industry. This one-Carnegie-unit course should only be taken after students successfully pass Beginning Industrial Maintenance.

- Scheduling and operating more than one course in the same classroom/laboratory with the same instructor is not allowed.
- Safety will be reinforced and tested at the beginning of each course.
- Students must complete Installation and Service Core with a score of 80/C or higher in class work to advance to the next level.

Beginning Industrial Maintenance—Course Code: 993012

Unit		Title	Hours
1		Orientation and Safety (Review and Reinforcement)	25
2		Gaskets and Packing, Pumps and Drivers, Introduction to Valves, Lubrication, and Welding	115
			140

Advanced Industrial Maintenance—Course Code: 993013

Unit		Title	Hours
3		Related Construction Math, Construction Drawings, Introduction to Test Equipment, Material Handling and Rigging, and Mobile and Support Equipment	70
4		Introduction to the National Electrical Code, Electrical Theory, Conductor Terminations and Splices, and Hydraulic and Pneumatic Controls	70
			140

Option 2—One, Two-Carnegie-Unit Course

This curriculum consists of one, two-credit course as follows:

1. **Industrial Maintenance—Course Code: 993011**

Course Description: **Industrial Maintenance**

Industrial Maintenance is a continuation with the emphasis on industrial maintenance. Topics include employability skills, safety, gaskets, packing, pumps, drivers, valves, lubrication, test equipment, material handling, national electrical code, conductor termination, hydraulics, and pneumatics. The course should be taken after the student has successfully passed Installation and Service Core.

- Scheduling and operating more than one course in the same classroom/laboratory with the same teacher is not allowed.
- Safety will be reinforced and tested at the beginning of each course.
- Students must complete Installation and Service Core with a score of 80/C or higher in class work to advance to the next level.

Industrial Maintenance—Course Code: 993011

Unit		Title	Hours
1		Orientation and Safety (Review and Reinforcement)	5
2		Gaskets and Packing, Pumps and Drivers, Introduction to Valves, Lubrication, and Welding	105
3		Related Construction Math, Construction Drawings, Introduction to Test Equipment, Material Handling and Rigging, and Mobile and Support Equipment	85
4		Introduction to the National Electrical Code, Electrical Theory, Conductor Terminations and Splices, and Hydraulic and Pneumatic Controls	85
			280

Information and Communication Technology

Program CIP: 11.0103 Information and Communication Technology

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Standards in this document are based on information from the following organizations:

Academic Standards

Mississippi Department of Education Subject Area Testing Program

21st Century Skills and Information and Communication Technologies Literacy Standards

In defining 21st century learning, the Partnership for 21st Century Skills has embraced five content and skill areas that represent the essential knowledge for the 21st century: Global awareness; civic engagement; financial, economic, and business literacy; learning skills that encompass problem solving, critical thinking, and self-directional skills; and Information and Communication Technology (ICT) Literacy.

National Educational Technology Standards for Students

Foreword

Secondary vocational-technical education programs in Mississippi are faced with many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

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Each secondary vocational-technical course consists of a series of instructional units which focus on a common theme. All units have been written using a common format which includes the following components:

- Unit Number and Title
- Suggested Time on Task - An estimated number of clock hours of instruction that should be required to teach the competencies and objectives of the unit. A minimum of 140 hours of instruction is required for each Carnegie unit credit. The curriculum framework should account for approximately 75-80 percent of the time in the course.
- Competencies and Suggested Objectives
    - A competency represents a general concept or performance that students are expected to master as a requirement for satisfactorily completing a unit. Students will be expected to receive instruction on all competencies.
    - The suggested objectives represent the enabling and supporting knowledge and performances that will indicate mastery of the competency at the course level.
- Suggested Teaching Strategies - This section of each unit indicates strategies that can be used to enable students to master each competency. Emphasis has been placed on strategies which reflect active learning methodologies. Teachers should feel free to modify or enhance these suggestions based on needs of their students and resources available in order to provide optimum learning experiences for their students.
- Suggested Assessment Strategies - This section indicates strategies that can be used to measure student mastery. Examples of suggested strategies could include rubrics, class participation, reflection, and journaling. Again, teachers should feel free to modify or enhance these suggested assessment strategies based on local needs and resources.
- Integrated Academic Topics, 21st Century Skills and Information and Communication Technology Literacy Standards, and Technology Standards for Students - This section identifies related academic topics as required in the Subject Area Assessment Program (SATP) in Algebra I, Biology I, English II, and U. S. History from 1877, which are integrated into the content of the unit. It also identifies the 21st Century Skills and Information and Communication Technology Literacy skills. In addition, national technology standards for students are associated with the competencies and suggested objectives for the unit are also identified.

- References - A list of suggested references is provided for each unit. The list includes some of the primary instructional resources that may be used to teach the competencies and suggested objectives. Again, these resources are suggested and the list may be modified or enhanced based on needs and abilities of students and on available resources.

Executive Summary

There is a growing sense of urgency that our country must act now to ensure that future generations of Americans can participate fully in the democratic process and the competitive global economy. Also, there is a broad consensus among educators, policy makers, business leaders, and the public that schools today must do a better job of preparing students for challenges and expectations of communities, workplaces, and higher education. The No Child Left Behind Act of 2001 (NCLB) recognizes the urgency of improving public education. The federal law requires students to be proficient in technology literacy by the eighth grade. Technology literacy is more than knowing how to use a computer; it is being able to use digital technology, communication tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledgeable society (Thomas & Knezek, 1995; Learning for the 21st Century, 2002).

Information and Communication Technology (ICT) is an instructional program that prepares individuals to effectively use technology in learning, communication, and life skills. The program is composed of two courses, ICT I and ICT II. In ICT I, students will complete a research-based program of study that includes interpersonal and self-directional skills; basic technology operation and technology concepts; social, ethical, and human issues in technology; technology communication tools; technology resource tools; multimedia presentation applications; word processing applications; spreadsheet applications; and publishing applications (Brown, Malfas, & Marreilli, 2004; Gregory, 2003; Hoggatt & Shank, 2006; Pasework & Pasework, 2003; Shelly, Cashman, & Vermatt, 2006). In ICT II, students will complete a research-based program of interpersonal and self-directional skills; input applications; technology lab management and networking; design applications; graphic design applications; web design applications; database applications; emerging technologies; and technology problem-solving and decision making skills (Brown, Malfas, & Marreilli, 2004; Gregory, 2003; Hoggatt & Shank, 2006; Pasework & Pasework, 2003; Shelly, Cashman, & Vermatt, 2006).

Upon completion of the two year ICT program, 8th grade students will have the opportunity to complete the Internet and Computing Core Certification (IC^3) certification. The IC^3 is a global, standards-based certification program for basic computing and Internet literacy. The IC^3 Program consists of integrated assessment and learning experiences that culminate in certification. The certification helps participants learn and demonstrate computer and Internet literacy through a worldwide industry standard. To become IC^3 certified, one must pass the following three exams: (a) Computing Fundamentals, (b) Key Applications, and (c) Living Online (Microsoft Certification, 2005).

The ICT curriculum aligns with the Mississippi Department of Education Subject Area Testing Standards, 21st Century Skills, and National Educational Technology Standards for Students. The ICT curriculum also provides students the opportunity to learn workplace skills by integrating 2005 Career Pathways.

Program Description

Information and Communication Technology (ICT) is an innovative instructional program that prepares students to effectively use technology in learning, communication, and life. Students in Information and Communication Technology I complete study in interpersonal and self-directional skills; basic technology operation and technology concepts; social, ethical, and human issues in technology; technology communication tools; technology resource tools; multimedia presentation applications; word processing applications; spreadsheet applications; and design applications.

Students in Information and Communication Technology II complete study in interpersonal and self-directional skills; input applications; technology lab management and networking; publishing applications; graphic design applications; web design applications; database applications; and technology problem-solving and decision making tools.

The ICT curriculum framework is built upon 21st Century Skills standards and the National Educational Technology Standards for Students. Career Pathways and Mississippi Department of Education Subject Area Testing benchmarks are integrated throughout the competencies, objectives, and suggested teaching and assessment strategies. Upon the successful completion of this program, students will be prepared to complete the IC^3 Computer Literacy exam and meet the eighth grade computer literacy requirement of the No Child Left Behind Act of 2001.

Course Outline

Information and Communication Technology I

Course CIP Code: 00.0251

1		Orientation and Ethics	10
2		Basic Operations and Technology Concepts	15
3		Technology Communication and Research Tools	10
4		Keyboarding	35
5		Word Processing and Publishing	35
6		Multimedia Applications	25
7		Career Exploration	10

Information and Communication Technology II

Course CIP Code: 00.0252

1	Safety and Orientation (Review and Reinforcement)	5
2	Input Applications	20
3	Spreadsheets	20
4	Database Applications	20
5	Technology Lab Management and Networking	10
6	Design Applications	15
7	Graphic Design Applications	15
8	Web Design Applications	20
9	Technology Problem-solving and Decision Making Tools	30

2014 Information and Communication Technology I

Mississippi Department of Education

Course Code: 000271

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Program Description

Information and Communication Technology I (ICT I) is an innovative instructional program that prepares students to effectively use technology in learning, communication, and life. Students in Information and Communication Technology I complete study in interpersonal and self-directional skills, basic technology operation and technology concepts, ethical issues in technology, keyboarding, technology communication tools, technology resource tools, multimedia presentation applications, word processing applications, and social media.

Licensure Requirements

The latest teacher licensure information can be found at http://www.mde.k12.ms.us/educator-licensure.

Professional Learning

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Information and Communication Technology I – Course Code: 000271

Unit	Unit Name	Career Cluster Focus	Hours
1	Orientation, Ethics, and Internet Tools	Law, Public Safety, Corrections, & Security	10
2	21st Century Learner Toolbox	None—Focus placed on the *Framework for 21st Century Learning*	15
3	Computing Fundamentals and Operating Systems	Information Technology	10
4	Keyboarding	Business Management & Administration	35
5	Word Processing	Education & Training	30
6	Multimedia Presentations	Hospitality & Tourism	30
7	Social Media	Government & Public Administration Law, Public Safety, Corrections, & Security	10
Total			140

2014 Information and Communication Technology II

Mississippi Department of Education

Course Code: 000272

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Preface

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The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act IV, 2007; and No Child Left Behind Act of 2001).

Program Description

Information and Communication Technology II (ICT II) is an innovative instructional program that prepares students to effectively use technology in learning, communication, and life. Students in Information and Communication Technology II complete study in interpersonal and self-directional skills, basic technology operation and technology concepts, ethical issues in technology, technology communication tools, lab management and networking, financial literacy, spreadsheet applications, database applications, design applications, graphic design applications, web design applications, and career preparation.

Licensure Requirements

The latest teacher licensure information can be found at

http://www.mde.k12.ms.us/educator-licensure

Professional Learning

If you have specific questions about the content of any of training sessions provided, please contact the Research and Curriculum Unit at 662.325.2510 and ask for a professional learning specialist.

Information and Communication Technology II – Course Code: 000272

Unit	Unit Name	Career Cluster Focus	Hours
1	Orientation, Ethics, and Keyboarding Continuation (ongoing)	Law, Public Safety, Corrections, & Security	15
2	Lab Management and Networking	Information Technology	10
3	Financial Literacy	Finance	15
4	Spreadsheet Applications	Human Services	15
5	Database Applications	Health Science	15
6	Design Applications	Science, Technology, Engineering, and Mathematics Transportation, Distribution, & Logistics Architecture & Construction	15
7	Graphic Design Applications	Arts, A/V Technology, & Communications Marketing	20
8	Web Design Applications	Agriculture, Food, & Natural Resources Manufacturing (Project covers career cluster of student's choice)	20
9	Career Preparation* *To be taught any time during the year in association with the next year's course selection	Education and Training	10
Total			135

Information Technology

Program CIP: 11.0101 Computer Technology/Computer Systems Technology

Ordering Information

Research and Curriculum Unit for Workforce Development
Vocational and Technical Education
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P.O. Drawer DX
Mississippi State, MS 39762
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Acknowledgments

The Information Technology curriculum was presented to the Mississippi Board of Education on January 16, 2009. The following persons were serving on the state board at the time:

Dr. Hank M. Bounds, Executive Secretary
Mr. Claude Hartley, Chair
Mr. William Harold Jones, Vice Chair
Mr. Howell "Hal" N. Gage
Dr. O. Wayne Gann
Ms. Rebecca Harris
Mr. Charles McClelland
Ms. Sondra Parker Caillavet
Ms. Rosetta Richards
Dr. David Sistrunk

Mike Mulvihill, Interim Associate State Superintendent of Education for the Office of Vocational Education and Workforce Development, at the Mississippi Department of Education assembled an oversight committee to provide input throughout the development of the *Information Technology Curriculum Framework and Supporting Materials.* Members of this task force are as follows:

CPOC Committee

Dr. Kay Berry, Simpson County School District
Dr. Sam Bounds, Mississippi Association of School Superintendents
Kevin F. Gilbert, Mississippi Association of Educators
David Campbell, Mississippi Association of Middle Level Educators
Tommye Dale Favre, Mississippi Department of Employment Security
Mary Hardy, Mississippi PTA
Anna Hurt, Mississippi Association of School Administrators
Jay Moon, Mississippi Manufacturers Association
Dr. Dean Norman, Center for Advanced Vehicular Systems Extension
Michael Ray, Western Line School District
George Schloegal, Hancock Bank
Charlene Sproles, Mississippi School Counselor Association
Mike Thomas, North American Coal Corporation
Pete Walley, Institutions of Higher Learning
Clarence Ward – Boys and Girls Clubs of the Gulf Coast
Debra West, State Board for Community and Junior Colleges

CPAT Committee

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Debbie Burnham, Forest-Scott County Vocational-Technical Center
Lynn Collier, Itawamba Community College
Rochelle Dahmer, Forrest County Public Schools
Dr. Diane Fisher, University of Southern Mississippi
Dr. Renée Gammill, Research and Curriculum Unit for Workforce Development
Denise Hanebuth, Mississippi Department of Education
Suzanne Johnson, Copiah-Lincoln Community College

Teresa Jones, Mississippi Department of Education
Jennifer Koon, Prentiss County Vocational Center
Dr. Nicole Lueg, Mississippi State University
Stephanie McCullough, Gulfport Public Schools
Danny Mitchell, Godwin Marketing
Emily Montgomery, Hinds Community College
Dr. Brian J. Reithel, University of Mississippi
Robin Silas, Mississippi Department of Education
Dr. Pam Smith, Mississippi Council on Economic Education
Pam Stuart, Clinton Public Schools
Melinda Young, Millsaps Career and Technology Center
Gail Litchliter, Mississippi Department of Information Technology Services
Walt Littleton, Ross Collins Career and Technical Center

Also, a special thanks is extended to the teachers who contributed teaching and assessment materials that are included in the framework and supporting materials. Members who contributed are as follows:

Brad Amacker, Petal High School, Petal, MS
Walt Littleton, Ross Collins Career and Technical Center, Meridian, MS

Appreciation is expressed to the following staff members at the Mississippi Department of Education who provided guidance and insight throughout the development process:

Angela Kitchens, Program Coordinator, Office of Vocational Education and Workforce Development, Mississippi Department of Education, Jackson, MS

Finally, standards in the *Information Technology Curriculum Framework and Supporting Materials* are based on the following:

Skill Standards for Information Technology
The *Skill Standards for Information Technology* was developed by a team of IT professionals from many companies across the nation and internationally. Funding for development of the standards was provided by the National Science Foundation. In addition to industry-specific technical skills, knowledge, and abilities, the standards include foundation skills required of all workers as well as technical skills common to all jobs within a career cluster across all industries. Reprinted with permission from the National Workforce Center for Emerging Technologies. Copyright © 2003. All rights reserved.

Applied Academic Credit Benchmarks
Mississippi Department of Education 2007 Mississippi Mathematics Framework Revised

21st Century Skills and Information and Communication Technologies Literacy Standards
In defining 21st century learning, the Partnership for 21st Century Skills has embraced five content and skill areas that represent the essential knowledge for the 21st century: Global awareness; civic engagement; financial, economic, and business literacy; learning

skills that encompass problem-solving, critical-thinking, and self-directional skills; and Information and Communication Technology (ICT) literacy.

National Educational Technology Standards for Students

~~ACT College Readiness Standards~~

~~The College Readiness Standards are sets of statements intended to help students understand what is expected of them in preparation for the ACT. These standards are integrated into teaching and assessment strategies throughout the curriculum framework.~~

~~Preface~~

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Information Technology Executive Summary

Program Description

The Information Technology program is designed to provide the basic foundation, skills, and knowledge for computer networking, applications, and support, along with an introduction to programming. Students will develop the skills necessary to prepare for certification exams and will learn how to develop, support, and integrate computing systems. They will acquire network planning and management skills and the ability to provide technical support. The program will provide hands-on experience in computer systems support and skill in network setup and maintenance.

Industry standards referenced are from the *Skill Standards for Information Technology* published by the National Workforce Center for Emerging Technologies. Program competencies are designed to prepare students for A+ certification. Additional research data used in the development of this publication were collected from a review of related literature and from surveys of local experts in business, industry, and education.

Industry Certification

Program competencies are designed to prepare students for A+ certification by integrating certification skills throughout the curriculum. *Skill Standards for Information Technology* is also referenced to assist in student preparation for IT careers.

Assessment

Students will be assessed using the Information Technology MS-CPAS2 test. The MS-CPAS2 blueprint can be found at http://info.rcu.msstate.edu/services/curriculum.asp. If there are questions regarding assessment of this program, please contact the Business instructional design specialists at the Research and Curriculum Unit at 662.325.2510.

Student Prerequisites

In order for students to be able to experience success in the Information Technology program, the following student prerequisites are in place:

8. C or higher in Pre-Algebra

or

9. TABE Math Computation and TABE Math Applied Score (eighth grade or higher)

or

10. Instructor Approval

Proposed Applied Academic Credit

The academic credit is still pending for this curriculum.

Licensure Requirements

The 954 license is needed to teach the Information Technology program. The requirements for the 954 license endorsement are listed below:

1. Applicant must have an associate's or higher degree and must have at least 2 years for an AA and 1 year for BS or higher of verifiable occupational experience in the past 10 years. Experience must be appropriate to the subject to be taught.
2. Applicant must enroll immediately in the Vocational Instructor Preparation (VIP) or the Redesign Education Program (REP).
3. Applicant must complete the individualized Professional Development Plan (PDP) requirements of the VIP or REP prior to the expiration date of the 3-year vocational license.
4. Applicant must possess and maintain A+ certification.
5. Applicant must successfully complete an MDE-approved computer literacy certification exam.
6. Applicant must successfully complete certification for an online learning workshop, module, or course that is approved by the MDE.
7. Applicant must successfully complete an information technology certification workshop, module, or course that is approved by the MDE.

Note: If an applicant meets all requirements listed above, that applicant will be issued a 954 endorsement – a 5-year license. If an applicant does not meet all requirements, the applicant will be issued a 3-year endorsement license, and all requirements stated above must be satisfied prior to the ending date of that license.

Professional Learning

The professional learning itinerary for the middle school or individual pathways can be found at http://redesign.rcu.msstate.edu. If you have specific questions about the content of each training session provided, please contact the Research and Curriculum Unit at 662.325.2510 and ask for the Professional Learning Specialist.

Course Outlines

Program CIP Code: 11.0101

The Information Technology pathway is offered in two options as outlined below.

Option 1 – Four One-Carnegie-Unit Courses

Course Description: Introduction to Information Technology includes the foundation skills required for building computer systems. Program competencies are designed to prepare students for A+ certification by integrating certification skills throughout the course.

Course Description: Computer Fundamentals provides an introduction to computer networking concepts. Program competencies are designed to prepare students for A+ certification by integrating certification skills throughout the course.

Course Description: Network Fundamentals includes advanced computer networking concepts including planning, design, and security. Program competencies are designed to prepare students for A+ certification by integrating certification skills throughout the course.

Course Description: Programming and Web Design provides instruction in Web page design, programming concepts, IT career opportunities, and emerging technologies in the field. Program competencies are designed to prepare students for A+ certification by integrating certification skills throughout the course.

Introduction to Information Technology (One Carnegie Unit) – Course Code: 992202

Unit		Title	Hours
1		Introduction to Information Technology	40
2		Introduction to Computer Hardware and Operating Systems	70
			110

Computer Fundamentals (One Carnegie Unit) – Course Code: 992203

Unit		Title	Hours
3		Basic Electricity and Data Communications	45
4		Computer Assembly, Configuration, and Diagnostics	60
			105

Network Fundamentals (One Carnegie Unit) – Course Code: 992204

Unit		Title	Hours
5		Network Concepts	40
6		Network Planning and Design	60
7		Network Security	40
			140

Programming and Web Design (One Carnegie Unit) – Course Code: 992205

Unit		Title	Hours
8		Web Design	45
9		Visual Basic	30
10		Career Development	30
			105

Option 2 – Two Two-Carnegie-Unit Courses

Course Description: Information and Technology I provides the foundation skills necessary for IT professionals including an introduction to computer hardware and operation systems; data communications; and computer assembly, configuration, and diagnostics. The program also provides an introduction to computer programming.

Course Description: Information and Technology II provides opportunities for students to develop advanced networking skills, Web design skills, and employability skills. This course should be taken only upon successful completion of Information Technology I.

Information Technology I (Two Carnegie Units) – Course Code: 992200

Unit		Title	Hours
1		Introduction to Information Technology	40
2		Introduction to Computer Hardware and Operating Systems	70

3		Basic Electricity and Data Communications	45
4		Computer Assembly, Configuration, and Diagnostics	60
			215

Information Technology II (Two Carnegie Units) – Course Code: 992201

Unit		Title	Hours
5		Network Concepts	40
6		Network Planning and Design	60
7		Network Security	40
8		Web Design	45
9		Visual Basic	30
10		Career Development	30
			245

2014 Information Technology

Mississippi Department of Education

Program CIP: 11.0101 – Computer Technology/Computer Systems Technology

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Research and Curriculum Unit
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Pathway Description

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Industry standards referenced are from the Skill Standards for Information Technology published by the National Workforce Center for Emerging Technologies. Program competencies are designed to prepare students for Strata IT Fundamentals certification and Microsoft Technology Associate: Networking Fundamentals certification. Additional research data used in the development of this publication were collected from a review of related literature and from surveys of local experts in business, industry, and education.

Industry Certification

Program competencies are designed to prepare students for Strata IT Fundamentals certification and Microsoft Technology Associate: Networking Fundamentals certification by integrating certification skills throughout the curriculum. Skill Standards for Information Technology is also referenced to assist in student preparation for IT careers.

Assessment

The latest assessment blueprint for the curriculum can be found at

http://www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Student Prerequisites

In order for students to be able to experience success in the IT program, the following student prerequisites are suggested:

1. C or higher in Pre-Algebra

   or

2. TABE Math Computation and TABE Math Applied Score (eighth grade or higher)

   or

3. Instructor Approval and TABE Reading Score (eighth grade or higher)

Applied Academic Credit

There is no academic credit at this time.

Teacher Licensure

The latest teacher licensure information can be found at

http://www.mde.k12.ms.us/educator-licensure

Professional Learning

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Option 1 – Four One-Carnegie-Unit Courses

This curriculum consists of four one-credit courses, which should be completed in the following sequence:

1. **Information Technology Fundamentals I—Course Code: 992208**
2. **Information Technology Fundamentals II—Course Code: 992209**
3. **Information Technology Networking I—Course Code: 992210**
4. **Information Technology Networking II—Course Code: 992211**

Course Description: Information Technology Fundamentals I
This course covers the explanation of technology and computer hardware basics, compatibility issues and common errors associated with computer hardware.

Course Description: Information Technology Fundamentals II
This course is a continuation of topics from Information Technology Fundamentals I and addresses additional technology topics including software installation and functions, security risks and prevention, Green IT and preventative maintenance of computers.

Course Description: Information Technology Networking I
This course covers the basic concepts of networking, each network operating system, networking types, standards and how data is encoded and transmitted.

Course Description: Information Technology Networking II
This course is a continuation of topics from Information Technology Networking I and addresses additional networking topics including network protocol, services, and career options. Students should be prepared to take the Microsoft Technology Associate: Networking Fundamentals Certification exam at the end of the course.

Information Technology Fundamentals I—Course Code: 992208

Unit	Unit Name	Hours
1	Introduction to Information Technology	40
2	Introduction to Computer Hardware	65
3	Compatibility Issues	20
Total		125

Information Technology Fundamentals II—Course Code: 992209

Unit	Unit Name	Hours
4	Introduction to Software	25
5	Security	35

6	Green Information Technology	50
Total		110

Information Technology Networking I—Course Code: Course Code: 992210

Unit	Unit Name	Hours
7	Network Infrastructures	60
8	Network Hardware	60
Total		120

Information Technology Networking II—Course Code: Course Code: 992211

Unit	Unit Name	Hours
9	Network Protocols and Services	70
10	Career Development	40
Total		110

Option 2 – Two Two-Carnegie-Unit Courses

This curriculum consists of two two-credit courses, which should be completed in the following sequence:

1. **Information Technology Associate I—Course Code: 992206**

2. **Information Technology Associate II—Course Code: 992207**

Course Description: Information Technology Associate I
This course covers the explanation of technology and computer hardware basics, compatibility issues, common errors associated with computer hardware, software installation and functions, security risks and prevention, Green IT and preventative maintenance of computers

Course Description: Information Technology Associate II
Networking Fundamentals teaches the basic concepts of networking, each network operating system, networking types, standards and how data is encoded and transmitted. This course is designed to prepare students for the Microsoft Technology Associate: Networking Fundamentals Certification Exam.

Information Technology Associate I—Course Code: 992206

Unit	Unit Name	Hours
1	Introduction to Information Technology	40
2	Introduction to Computer Hardware	65
3	Compatibility Issues	20
4	Introduction to Software	25
5	Security	35
6	Green Information Technology	50
Total		235

Information Technology Associate II—Course Code: 992207

Unit	Unit Name	Hours
7	Network Infrastructures	60
8	Network Hardware	60
9	Network Protocols and Services	70
10	Career Development	40
Total		230

2005 Mississippi Curriculum Framework

Secondary Hotel, Restaurant, and Tourism Management

(Program CIP: 52.0901 – Hospitality Administration/Management)

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Professional Curriculum Advisory Team:	Biloxi Public Schools Career Development Center, Hospitality and Lodging Advisory Committee Hancock County School District Vocational & Technical Center, Hospitality and Lodging Advisory Committee Jackson Public Schools Career Development Center, Hospitality and Lodging Advisory Committee Meridian Community College, Hotel, Restaurant, and Tourism Advisory Committee

Standards in this document are based on information from the following organizations:

Guidelines for Certifications in Hospitality, Lodging, and Tourism Programs	American Hotel & Lodging Association materials used with permission.
Academic Standards	Mississippi Department of Education Subject Area Testing Program
Workplace Skills for the 21st Century	Secretary's Commission on Achieving Necessary Skills
ISTE National Educational Technology Standards for Students	Reprinted with permission from *National Educational Technology Standards for Students: Connecting Curriculum and Technology*, copyright © 2000, ISTE (International Society for Technology in Education), 1.800.336.5191 (U.S. & Canada) or 1.541.302.3777 (International), iste@iste.org, www.iste.org. All rights reserved. Permission does not constitute an endorsement by ISTE.

Foreword

Secondary vocational-technical education programs in Mississippi are faced with many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

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Each secondary vocational-technical course consists of a series of instructional units which focus on a common theme. All units have been written using a common format which includes the following components:

- Unit Number and Title
- Suggested Time on Task - An estimated number of clock hours of instruction that should be required to teach the competencies and objectives of the unit. A minimum of 140 hours of instruction is required for each Carnegie unit credit. The curriculum framework should account for approximately 75-80 percent of the time in the course.
- Competencies and Suggested Objectives
  - A competency represents a general concept or performance that students are expected to master as a requirement for satisfactorily completing a unit. Students will be expected to receive instruction on all competencies.
  - The suggested objectives represent the enabling and supporting knowledge and performances that will indicate mastery of the competency at the course level.
- Suggested Teaching Strategies - This section of each unit indicates strategies that can be used to enable students to master each competency. Emphasis has been placed on strategies which reflect active learning methodologies. Teachers should feel free to modify or enhance these suggestions based on needs of their students and resources available in order to provide optimum learning experiences for their students.
- Suggested Assessment Strategies - This section indicates strategies that can be used to measure student mastery. Examples of suggested strategies could include rubrics, class participation, reflection, and journaling. Again, teachers should feel free to modify or enhance these suggested assessment strategies based on local needs and resources.

- ~~Integrated Academic Topics, Workplace Skills, Technology Standards, and Occupational Standards - This section identifies related academic topics as required in the Subject Area Assessment Program (SATP) in Algebra I, Biology I, English II, and U. S. History from 1877, which are integrated into the content of the unit. It also identifies the general workplace skills as identified in the Secretary's Commission on Achieving Necessary Skills (SCANS) report as being critical for all workers in the 21st Century. In addition, national technology standards and occupational skills standards associated with the competencies and suggested objectives for the unit are also identified.~~
- ~~References - A list of suggested references is provided for each unit. The list includes some of the primary instructional resources that may be used to teach the competencies and suggested objectives. Again, these resources are suggested and the list may be modified or enhanced based on needs and abilities of students and on available resources.~~

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~~Program Description~~

~~Hotel, Restaurant, and Tourism Management includes an overview of the travel/tourism, lodging, and food service industries. The program focuses on marketing, supervisory skills, front office, reservations, bell service, housekeeping, safety, customer service, communications, food service, banquet, catering, and employability skills. Program completers are prepared to assume entry level positions in the hospitality industry or to enter advanced studies at the postsecondary level. Completers with 90 days of specialized industry work experience are eligible to obtain certification from American Hotel & Lodging Association's Educational Institute in the following Line Level areas: Bell Attendant, Concierge, Front Desk, Room Attendant, Reservationist, Banquet Server, Banquet Set-Up, Busperson, Kitchen Steward, Restaurant Server, and Room Service.~~

Course Outline

Hotel, Restaurant, and Tourism Management I

Course CIP Code: 06.0711

Unit	Title	Hours
Unit 1:	Program Orientation	5
Unit 2:	Introduction to the Hospitality Industry	10
Unit 3:	The Role of Customer Service in the Hospitality Industry	25
Unit 4:	Organization of Lodging Property	15
Unit 5:	Front Office Department	35
Unit 6:	Housekeeping Department	30
Unit 7:	Security in Lodging Operations	30
Unit 8:	Food Service in the Hospitality Industry	35
Unit 9:	Banquet and Catering	15
Unit 10:	Employability Skills	15
Unit 11:	Special Topics in Hotel, Restaurant, and Tourism Management I (ongoing)	22

Hotel, Restaurant, and Tourism Management II

Course CIP Code: 06.0712

Unit	Title	Hours
Unit 1:	Program Orientation	5
Unit 2:	Overview of the Hospitality Industry	5
Unit 3:	Computerized Front Office Procedures	15
Unit 4:	Supervision and Human Relations in the Hospitality Industry	15
Unit 5:	Accounting	20
Unit 6:	Safety	30
Unit 7:	Food and Beverage Cost Controls	30
Unit 8:	Travel and Tourism	30
Unit 9:	Hospitality Marketing	25
Unit 10:	Employability Skills	25
Unit 11:	Special Topics in Hotel, Restaurant, and Tourism Management II (ongoing)	22

2014 Lodging, Hospitality, and Tourism Management

Mississippi Department of Education

Program CIP: 52.0901 – Hospitality Administration/Management, General

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Mississippi State, MS 39762

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Secondary career and technical education programs in Mississippi face many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act IV, 2007; and No Child Left Behind Act of 2001).

Pathway Description

The Lodging, Hospitality and Tourism Management pathway encompasses the management, marketing, and operation of lodging, restaurants, and tourism related services. This program offers a sequence of courses that provide coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare students for further education and careers in the hospitality and tourism industry. Students' technical skill knowledge is further enhanced through experiences in authentic, real-world problems that contribute to their academic knowledge, higher-order reasoning and problem-solving skills, and general employability skills that ensure their success in the 21st century workplace.

Industry Certification

The American Hotel and Lodging Association (AH&LA) is the sole national association representing all sectors and stakeholders in the lodging industry. The AH&LA's Educational Institute offers professional certification in all facets of the hospitality industry. Students who complete the Lodging, Hospitality, and Tourism Management pathway will be prepared to complete the requirements of the Certified Guest Service Professional (CGSP). The CGSP designation provides recognition for those individuals that know how to achieve and express exceptional service by engaging with their guests and creating memorable experiences. Recognized worldwide, the CGSP designation is the highest acknowledgment of awarding-winning guest service for employees in the hospitality industry.

Assessment

The latest assessment blueprint for the curriculum can be found at http://www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Student Prerequisites

In order for students to be able to experience success in this program, the following student prerequisites are suggested:

1. C or higher in English (the previous year)
2. C or higher in Math (last course taken or the instructor can specify the math)
3. Instructor Approval and TABE Reading Score (eighth grade or higher)

or

1. TABE Reading Score (eighth grade or higher)
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1. Instructor Approval

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Professional Learning

If you have specific questions about the content of each training session provided, please contact the Research and Curriculum Unit at 662.325.2510, and ask for the Professional Learning Specialist.

Option 1—Four One-Carnegie-Unit Courses

This curriculum consists of four one-credit courses, which should be completed in the following sequence:

1. **Hospitality Services I—Course Code: 992102**
2. **Hospitality Services II—Course Code: 992103**
3. **Hospitality Services III—Course Code: 992104**
4. **Hospitality Services IV—Course Code: 992105**

Course Description: Hospitality Services I

This course introduces students to the hospitality and tourism industry and identifies some of the current and future trends affecting the hospitality and tourism industry and the impact this industry has on society and the global economy. Students will explore hospitality and tourism career opportunities and understand the skills and knowledge required to succeed in this field and the importance of offering outstanding customer services. The course also covers the main operational areas found in most lodging properties and the importance of adhering to safety policies and procedures to maintain a safe and secure environment for employees and guests.

Course Description: Hospitality Services II

This course identifies some additional operational areas and their role within the hospitality industry. Students will learn how food and beverage services function within the industry and the proper techniques used to set up banquets, catering functions, and other special events. Students will gain an understanding of how resorts, cruise lines, recreational vehicles, and tent camping are part of the hospitality industry. Students learn the role of sales and marketing in the hospitality and tourism industry.

Course Description: Hospitality Services III

This course provides an overview of the new technologies used to enhance productivity and competitiveness in the hospitality and tourism industry. Students will learn management and leadership skills and how management deals with security and risk issues. Financial operations associated with hospitality and tourism industry will also be discussed.

Course Description: Hospitality Services IV

This course provides a more in-depth view of travel and tourism operations, management's role in sales and marketing and the employability skills needed to be successful in the workforce. Students will also have the opportunity to engage in a special project that is aligned with their particular area of interest in the hospitality and tourism industry.

Hospitality Services I—Course Code: 992102

Unit	Unit Name	Hours
1	Program Orientation	5
2	Introduction to the Hospitality and Tourism Industry	15
3	Customer Service in the Hospitality and Tourism Industry	20
4	Organization of Lodging Property	50
5	Security in Lodging Operations	15
Total		105

Hospitality Services II—Course Code: 992103

Unit	Unit Name	Hours
6	Food and Beverage Services	40
7	Banquet and Catering	15
8	Resort Operations	15
9	Hospitality Sales and Marketing	35
Total		105

Hospitality Services III—Course Code: 992104

Unit	Unit Name	Hours
10	Computerized Front Office Procedures	20
11	Management and Human Resources within the Hospitality Industry	40
12	Safety and Risk Management	15
13	Accounting and Operational Finance	25
Total		100

Hospitality Services IV—Course Code: 992105

14	Travel and Tourism	40
15	Hospitality Sales and Marketing Management	30
16	Employability Skills	25
17	Special Projects	20
Total		115

Option 2—Two Two-Carnegie-Unit Courses

This curriculum consists of two two-credit courses, which should be completed in the following sequence:

1. **Lodging, Hospitality, and Tourism Management I—Course Code: 992100**
2. **Lodging, Hospitality, and Tourism Management II—Course Code: 992101**

Course Description: Lodging, Hospitality, and Tourism Management I

This course combines Hospitality Services I and II into a two Carnegie unit course.

Course Description: Lodging, Hospitality, and Tourism Management II

This course combines Hospitality Services III and IV into a two Carnegie unit course.

Lodging, Hospitality, and Tourism Management I—Course Code: 992100

Unit	Unit Name	Hours
1	Program Orientation	5
2	Introduction to the Hospitality and Tourism Industry	15
3	Customer Service in the Hospitality and Tourism Industry	20
4	Organization of Lodging Property	50
5	Security in Lodging Operations	15
6	Food and Beverage Services	40
7	Banquet and Catering	15
8	Resort Operations	15
9	Hospitality Sales and Marketing	35
Total		210

Lodging, Hospitality, and Tourism Management II—Course Code: 992101

Unit	Unit Name	Hours
10	Computerized Front Office Procedures	20
11	Management and Human Resources within the Hospitality Industry	40
12	Safety and Risk Management	15
13	Accounting and Operational Finance	25
14	Travel and Tourism	40

15	Hospitality Sales and Marketing Management	30
16	Employability Skills	25
17	Special Projects	20
Total		215

Welding Technology

Program CIP: 48.0508 - WELDING

Ordering Information

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Vocational and Technical Education
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Acknowledgments

The Welding curriculum was presented to the Mississippi Board of Education on February 19, 2010. The following persons were serving on the state board at the time:

Dr. Tom Burnham, State Superintendent
Mr. William Harold Jones, Chair
Mr. Charles McClelland, Vice Chair
Ms. Kami Bumgarner
Mr. Howell "Hal" N. Gage
Dr. O. Wayne Gann
Mr. Claude Hartley
Ms. Martha "Jackie" Murphy
Ms. Rosetta Richards
Dr. Sue Matheson

Mike Mulvihill, Interim Associate State Superintendent of Education for the Office of Vocational Education and Workforce Development at the Mississippi Department of Education, assembled an oversight committee to provide input throughout the development of the *Welding Curriculum Framework and Supporting Materials.* Members of this task force were as follows:

John Bass, Mississippi Manufacturing Association
Mike Barkett, Mississippi Construction Education Foundation
Sam Davis, Mississippi Department of Education
Doug Ferguson, Research and Curriculum Unit
Dr. Bob Fuller, Starkville Public Schools
James Ivy, Northrop Grumman
Sarah Lay, Student, Vicksburg, MS
Dr. Edward C. Mann, University of Southern Mississippi
Jennifer Marshall, Viking Corporation
Jackie McElwain, Kosciusko Public Schools
Mike McCullough, East Mississippi Community College
Darnell Ramshur, Carl Loftin Vocational Center
Kirk Sullivan, Simpson County Vocational Center
Andy Sims, Mississippi Department of Education
Meda Vassar, Pontotoc County School District
Minadene Waldrop, Rankin County Schools
Jo Ann Watts, Research and Curriculum Unit
Haley Weeks, Petal Vocational Center
Bill Welch, Mississippi Department of Education
Maurice Whalen, Clinton Career Complex
Lisa White, Carl Loftin Vocational Center

Also, special thanks are extended to the teachers who contributed teaching and assessment materials that are included in the framework and supporting materials. Members who contributed are as follows:

John Lawrence, Humphries County Career Technical Center, Belzoni
Dewanye Ling, Monroe County Career Technical Center, Amory
Herman Phillips, Noxubee County Career Technical Center, Macon

Appreciation is expressed to the following staff members at the Mississippi Department of Education who provided guidance and insight throughout the development process:

Andy Sims, Program Coordinator, Office of Vocational Education and Workforce Development, Mississippi Department of Education, Jackson, MS
Chris Wall, Director of Instructional Programs and Student Organizations, Office of Vocational Education and Workforce Development, Mississippi Department of Education, Jackson, MS

Finally, standards in the *Welding Curriculum Framework and Supporting Materials* are based on the following:

Contren Learning Series from the National Center for Construction Education and Research

Applied Academic Credit Benchmarks

Mississippi Department of Education 2007 Mississippi Mathematics Framework Revised

21st Century Skills and Information and Communication Technologies Literacy Standards

In defining 21st century learning, the Partnership for 21st Century Skills has embraced five content and skill areas that represent the essential knowledge for the 21st century: global awareness; civic engagement; financial, economic, and business literacy; learning skills that encompass problem-solving, critical-thinking, and self-directional skills; and Information and Communication Technology (ICT) literacy.

National Educational Technology Standards for Students

ACT College Readiness Standards

The College Readiness Standards are sets of statements intended to help students understand what is expected of them in preparation for the ACT. These standards are integrated into teaching and assessment strategies throughout the curriculum framework.

Preface

Secondary vocational–technical education programs in Mississippi are faced with many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

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Welding Executive Summary

Program Description

Welding is an instructional program that prepares students for employment or continued education in the occupations of the welding field. The curriculum framework for this program was developed in partnership with the Mississippi Construction Education Foundation (MCEF). MCEF is the accredited sponsor for the National Center for Construction Education and Research (NCCER).

Industry Certification

The NCCER developed and published a set of industry standards that are taught nationwide by contractors, associations, construction users, and secondary and postsecondary schools called the **Contren Learning Series.** When developing this set of standards, the NCCER assembled a team of subject matter experts that represented construction companies and schools across the nation. Each committee met several times and combined experts' knowledge and experience to finalize the set of national industry standards.

As a part of the accreditation process, all Mississippi Construction Technology instructors will be required to successfully complete the **Instructor Certification Training Program**. This program ensures that instructors possess a deep knowledge of content of the standards.

This state-of-the-art curriculum is modeled after the eight Mississippi **NCCER Accredited Training and Education Facilities (ATEF)**. In order to become an NCCER ATEF program, school districts must meet a set of guidelines including the following:

11. Use the approved curriculum.
12. All instructors must be NCCER certified.
13. All completed Form 200s and release forms on all student completions are to be forwarded to MCEF for proper approval. MCEF will in turn forward to NCCER for processing.
14. Follow NCCER guidelines on test security and performance profiles.
15. Have an active advisory committee with at least two commercial contractors involved.
16. Follow safety practices and Occupational Safety and Health Administration (OSHA) standards used in the class and lab areas.
17. Involve commercial contractors in class presentations or field trips.
18. All construction programs must be included in the accreditation process.
19. Show active involvement in student leadership development (e.g., VICA and SkillsUSA).
20. Provide demonstrated placement into construction-related occupations, and provide timely reports to MCEF.

Districts will be required to complete a self-evaluation of all programs and host a site visit from industry to ensure proper lab, safety, and instructional procedures are in place.

Articulation

The following articulation plans are in place for the Installation and Service Pathway:

High School Program	Community College Program	Community College Course
Welding Theory and Applications	Welding and Cutting Tech Industrial Maintenance Trades	WLV 1116 - Shielded Metal Arc Welding I (effective 2006) IMM 1734 - Maintenance Welding and Metals

Assessment

Students will be assessed using the Welding MS-CPAS2 test. The MS-CPAS2 blueprint can be found at http://info.rcu.msstate.edu/services/curriculum.asp. If there are questions regarding assessment of this program, please contact the Construction and Manufacturing instructional design specialists at the Research and Curriculum Unit at 662.325.2510.

Student Prerequisites

In order for students to be successful in the Welding program, the following student prerequisites are in place:

11. C or higher in English (the previous year)
12. C or higher in Math (last course taken or the instructor can specify the math)

or

13. Instructor Approval and TABE Reading Score (eighth grade or higher)

or

14. Instructor Approval

Proposed Applied Academic Credit

Applied Math content from the curriculum was aligned to the 2007 Mississippi Math Framework Revised Academic Benchmarks. It is proposed that upon the completion of this program, students will earn 1/2 Applied Math credit that can be used for graduation requirements.

The applied academic credit has ***not*** been approved by the Mississippi Commission on School Accreditation or by the State Board of Education. If there are questions regarding applied academic credit, please contact the Coordinator of Workforce Education at the Research and Curriculum Unit at 662.325.2510.

Licensure Requirements

A (975) educator license is required to teach the Welding program. Requirements for the (975) endorsements are listed below:

10. Applicant must hold a 2-year college degree (associate's degree) or higher from an accredited institution of higher education.
11. Applicant with an associate's degree must have at least 2 years of verifiable occupational experience in the past 10 years. Experience must be appropriate to the subject to be taught. Applicant with a bachelor's or higher degree must have at least 1 year of verifiable occupational experience in the past 10 years. Experience must be appropriate to the subject to be taught.
12. Applicant must enroll immediately in the Vocational Instructor Preparation (VIP) or the *Redesign* Education Program (REP).
13. Applicant must complete the individualized Professional Development Plan (PDP) requirements of the VIP or REP prior to the expiration date of the 3-year vocational license.

14. Applicant must earn a passing score on **Welding** assessment from National Craft Assessment and Certification Program.
15. Applicant must successfully complete the Contren Instructor Certification.
16. Applicant must successfully complete an MDE-approved computer literacy certification exam.
17. Applicant must successfully complete certification for an online learning workshop, module, or course that is approved by the MDE.
18. Applicant must successfully complete the **Welding** certification workshop, module, or course that is approved by the MDE.

Note: If the applicant meets all requirements listed above, that applicant will be issued a (975) endorsement – a 5-year license. If the applicant does not meet **all** requirements, the applicant will be issued a 3-year endorsement (license), and all requirements stated above must be satisfied prior to the ending date of that license.

Professional Learning

The professional learning itinerary for the middle school or individual pathways can be found at http://redesign.rcu.msstate.edu. If you have specific questions about the content of each training session provided, please contact the Research and Curriculum Unit at 662.325.2510, and ask for the Professional Learning Specialist.

Course Outlines

This curriculum framework allows options for local school districts to implement based on student needs and scheduling demands. This curriculum offers a four-Carnegie-unit program.

Option 1

Upon completion of this option, the student will be trained to take the **NCCER Level 1 Core Certification and the Welding Level 1 Certification** exams. This curriculum consists of four one-credit courses, which should be completed in the following sequence:

Introduction to Welding ..... (Course Code: 993300)
Advanced Welding ..... (Course Code: 993301)

Course Description: Introduction to Welding is a course in which students learn about welding technology including Math, Introduction to Blueprints, Hand and Power Tools, Orientation to the Trade, Introduction to Welding, and Shielding Metal Arc Welding. This is a two-Carnegie-unit course.

- Scheduling and operating more than one course in the same classroom/laboratory with the same instructor is not allowed.
- Safety will be reinforced and tested at the beginning of each course.

Course Description: Advanced Welding is a continuation of Welding I with the emphasis on Gas Metal Arc Welding, Flux Core Arc Welding, Gas Tungsten Arc Welding, and applications of production welding processes. The course should be taken after the student has successfully passed Welding I. This is a two-Carnegie-unit course.

- Scheduling and operating more than one course in the same classroom/laboratory with the same instructor is not allowed.
- Safety will be reinforced and tested at the beginning of each course.
- Students must complete welding courses with a score of 80/C or higher in class work to advance to the next level.

Introduction to Welding (Course Code: 993300)

Unit		Title	Hours
1		Orientation, Leadership, and Safety	35
2		Welding Math	35
3		Introduction to Blueprints (Welding Symbols), Hand and Power Tools, and Basic Rigging	40
4		Base Metal Preparation, Weld Quality, Oxy-fuel Cutting	45
5		Introduction to Shielded Metal Arc Welding (SMAW) (Equipment and Setup, Electrodes, Beads and Fillet Welds)	125
			280

Advanced Welding (Course Code: 993301)

Unit		Title	Hours
6		Orientation and Safety (Review and Reinforcement of Unit 1)	35
5		Introduction to Shielded Metal Arc Welding (SMAW) (Equipment and Setup, Electrodes, Beads and Fillet Welds)	105
7		Gas Metal Arc Welding (GMAW) and Flux Core Arc Welding (FCAW)	100
8		Gas Tungsten Arc Welding (GTAW)	40
			280

Option 2

Upon completion of this option, the student will be trained to take the **NCCER Level 1 Core Certification and the Welding Level 1 Certification** exams. This curriculum consists of four one-credit courses, which should be completed in the following sequence:

Orientation and Cutting .....(Course Code: 993302)
Shielded Metal Arc Welding (SMAW) .....(Course Code: 993303)
Gas Metal, Flux Core, and Gas Tungsten Welding (GMAW, FCAW, and GTAW)(Course Code: 993304)
Production Welding Processes .....(Course Code: 993305)

Course Description: Orientation and Cutting (Course Code: 993302) includes an introduction to the field as well as Fundamentals of Safety, Math, Blueprint Reading, Hand and Power Tools, and Oxy-fuel and Plasma Cutting Devices. This is a one-Carnegie-unit course.

Course Description: Shielded Metal Arc Welding (Course Code: 993303) emphasizes an overview of safety and shielded metal arc welding processes and equipment. This course gives students real-world, hands-on practice in these areas. This one-Carnegie-unit course should only be taken after students successfully pass Orientation and Cutting.

Course Description: Gas Metal, Flux Core, and Gas Tungsten Welding (Course Code: 993304) includes an in-depth study of the gas metal arc welding, flux-core arc welding, and gas tungsten arc welding processes and equipment. This one-Carnegie-unit course should only be taken after students successfully pass Orientation and Cutting.

Course Description: Production Welding Processes (Course Code: 993305) includes an overview of Resistance Welding, Robotic Welding, Frictional Stir Welding, and Induction Welding. This one-Carnegie-unit course should only be taken after students successfully pass Orientation and Cutting and Gas Metal, Flux Core, and Gas Tungsten Welding.

- Safety will be reinforced and tested at the beginning of each course.
- Students must complete previous welding courses with a score of 80/C or higher in class work to advance to the next level.

~~Orientation and Cutting (Course Code: 993302)~~

~~Unit~~		~~Title~~	~~Hours~~
~~1~~		~~Orientation, Leadership, and Safety~~	~~35~~
~~2~~		~~Welding Math~~	~~40~~
~~3~~		~~Introduction to Blueprints(Welding Symbols), Hand and Power Tools, and Basic Rigging~~	~~65~~
			~~140~~

~~Shielded Metal Arc Welding [SMAW] (Course Code: 993303)~~

~~Unit~~		~~Title~~	~~Hours~~
~~6~~		~~Orientation and Safety (Review and Reinforcement of Unit 1)~~	~~5~~
~~4~~		~~Base Metal Preparation and Weld Quality, Oxy-fuel Cutting, Plasma Arc Cutting, and Carbon Arc Cutting~~	~~65~~
~~5~~		~~Shielded Metal Arc Welding (SMAW)~~	~~135~~
			~~140~~

~~Gas Metal, Flux Core, and Gas Tungsten Welding [GMAW, FCAW, and GTAW] (Course Code: 993304)~~

~~Unit~~		~~Title~~	~~Hours~~
~~6~~		~~Orientation and Safety (Review and Reinforcement of Unit 1)~~	~~5~~
~~7~~		~~Gas Metal Arc Welding (GMAW) and Flux Core Arc Welding (FCAW)~~	~~95~~
~~8~~		~~Gas Tungsten Arc Welding (GTAW)~~	~~40~~
			~~140~~

~~Production Welding Processes (Course Code: 993305)~~

~~Unit~~		~~Title~~	~~Hours~~
~~6~~		~~Orientation and Safety (Review and Reinforcement of Unit 1)~~	~~5~~
~~9~~		~~Production Welding Processes~~	~~135~~
			~~140~~

2014 Welding

Mississippi Department of Education

Program CIP: 48.0508 – Welding Technology/Welder

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or

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Professional Learning

If you have specific questions about the content of any of training sessions provided, please contact the Research and Curriculum Unit at 662.325.2510 and ask for a professional-learning specialist.

Option 1—Four One-Carnegie-Unit Courses

This curriculum consists of four one-credit courses, which should be completed in the following sequence:

1. **Orientation and Cutting—Course Code: 993302**
2. **Shielded Metal Arc Welding (SMAW)—Course Code: 993303**
3. **Advanced Welding I—Course Code: 993304**
4. **Advanced Welding II—Course Code: 993306**

Course Description: Orientation and Cutting

This course focuses on the NCCER Learning Series Core. Students will leave the class with a firm foundation of knowledge in the areas of employability skills, safety, and basic tool knowledge. Additionally, students will learn Oxyfuel Cutting fundamentals.

Course Description: Shielded Metal Arc Welding (SMAW)

This course introduces students to Shielded Metal Arc Welding (SMAW). Students will focus on proper equipment setup, safety measures, and proper welding techniques.

Course Description: Advanced Welding I

This course focuses on specialized welding symbols used in blueprints and drawings. Additionally, students will learn about Plasma Arc Cutting (PAC), Carbon Arc Cutting (CAC), and advanced techniques used in SMAW.

Course Description: Advanced Welding II

This course will offer students the opportunity to examine Gas Metal Arc Welding (GMAW) and Flux-Cored Arc Welding (FCAW). Additionally, students will learn about Gas Tungsten Arc

Welding (GTAW). Students will learn safety measures, setup procedures, and welding techniques for each type of welding.

Orientation and Cutting—Course Code: 993302

Unit	Unit Name	Hours
1	Introduction and Orientation	15
2	Basic Safety	15
3	Introduction to Construction Math	15
4	Hand and Power Tools	15
5	Introduction to Blueprints and Basic Rigging	15
6	Introduction to Materials Handling	8
7	Base Metal Preparation, Weld Quality, Joint Fit-up, Alignment, and Oxyfuel Cutting	62
Total		145

Shielded Metal Arc Welding [SMAW]—Course Code: 993303

Unit	Unit Name	Hours
8	Shielded Metal Arc Welding (SMAW)	135
Total		135

Advanced Welding I—Course Code: 993304

Unit	Unit Name	Hours
9	Orientation and Welding Safety Review	8
10	Welding Symbols and Reading Welding Detail Drawings	15
11	Plasma Arc Cutting (PAC) and Carbon Arc Cutting and Gouging (CAC-A)	15
12	Advanced Shielded Metal Arc Welding (SMAW)	102
Total		140

Advanced Welding II—Course Code: 993306

Unit	Unit Name	Hours
13	Gas Metal Arc Welding (GMAW) & Flux-Core Arc Welding (FCAW)	80
14	Gas Tungsten Arc Welding (GTAW)	60
Total		140

Option 2—Two Two-Carnegie-Unit Courses

This curriculum consists of two two-credit courses, which should be completed in the following sequence:

1. **Introduction to Welding—Course Code: 993300**
2. **Advanced Welding—Course Code: 993301**

Course Description: Introduction to Welding

This course focuses on the NCCER Learning Series Core and SMAW. Students will leave the class with a firm foundation of knowledge in the areas of employability skills, safety, and basic tool knowledge. Additionally, students will learn Oxyfuel Cutting fundamentals. Students will cover proper equipment setup, safety measures, and correct welding techniques.

Course Description: Advanced Welding

This course focuses on specialized welding symbols used in blueprints and drawings as well as PAC, CAC, and advanced techniques used in SMAW. Additionally, this course will offer students the opportunity to examine GMAW and FCAW. Additionally, students will learn about GTAW. Students will learn safety measures, setup procedures, and welding techniques for each type of welding.

Introduction to Welding—Course Code: 993300

1	Introduction and Orientation	15
2	Basic Safety	15
3	Introduction to Construction Math	15
4	Hand and Power Tools	15
5	Introduction to Blueprints and Basic Rigging	15
6	Introduction to Materials Handling	8
7	Base Metal Preparation and Weld Quality, Joint Fit-up and Alignment, and Oxyfuel Cutting	62
8	Shielded Metal Arc Welding (SMAW)	135
Total		280

Advanced Welding—Course Code: 993301

9	Orientation and Welding Safety Review	8
10	Welding Symbols and Reading Welding Detail Drawings	15
11	Plasma Arc Cutting and Carbon Arc Cutting and Gouging	15
12	Advanced Shielded Metal Arc Welding (SMAW)	102
13	Gas Metal Arc Welding (GMAW) & Flux-Core Arc Welding (FCAW)	80
14	Gas Tungsten Arc Welding (GTAW)	60
Total		280