

MASONRY II

COURSE DESCRIPTION

Masonry II is a course in which students will learn and practice intermediate skills related to masonry construction in residential and commercial structures. Topics covered include safe practices, advanced construction drawing interpretation, design of panel and curtain

It is strongly recommended that administration and guidance follow the scope and sequence and course recommendations as listed.

Recommended: Construction Core, Masonry I, Algebra I, Geometry, Principles of Technology I or Physical Science

Recommended Credits: 2

Recommended Grade Level: 11th 12th

Number of Competencies in Course: 53

MASONRY II

STANDARDS

- 1.0** Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.
- 2.0** Students will take personal responsibility for the safety of themselves, their coworkers, and bystanders.
- 3.0** Students will interpret, lay out, and fabricate in conformance to construction drawings and written specifications.
- 4.0** Students will explain requirements for construction of residential foundations.
- 5.0** Students will identify and describe ingredients of and types of grout used in masonry work.
- 6.0** Students will demonstrate metal work in masonry.
- 7.0** Students will recognize and demonstrate advanced laying techniques.
- 8.0** Students will identify construction techniques and moisture control.
- 9.0** Students will describe construction inspection and quality control.

MASONRY II

STANDARD 1.0

Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

LEARNING EXPECTATIONS

The student will:

- 1.1** Demonstrate leadership skills.
- 1.2** Use problem-solving techniques to address and propose solutions to school, community, and workplace problems.
- 1.3** Demonstrate the ability to work professionally with others.
- 1.4** Participate in SkillsUSA as an integral part of instruction.
- 1.5** Exhibit integrity and pride in artisanship.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 1.1A** Uses critical-thinking and consensus building skills in group deliberations.
- 1.1B** Keeps group work focused on task.
- 1.2A** Determines the root causes of observed conflicts or problems.
- 1.2B** Mediates disputes between parties.
- 1.3A** Participates in a job shadowing experience.
- 1.3B** Assembles a student team to solve an assigned problem.
- 1.4** Attends and participates in periodic meetings of SkillsUSA or similar organization.
- 1.5** Exhibits integrity and pride in artisanship.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Prepare a resume.
- Participate in various SkillsUSA or similar programs and/or competitive events.
- Attend a professional organization meeting, such as local Chamber of Commerce meeting.
- Participate in the American Spirit Award competition with SkillsUSA.
- Participate in job shadowing or internship program with local business or industry.
- Take an active role in a group project assigned by the instructor.
- Identify and detail a problem area in the school, community, or workplace and propose solutions. If possible, and with appropriate approvals, implement or facilitate the solution.

INTEGRATION LINKAGES

SkillsUSA *Professional Development Program (PDP)*, SkillsUSA, SkillsUSA *Total Quality Curriculum*, Communication and Writing Skills, Teambuilding Skills, Research, Language Arts, Sociology, Psychology, Algebra, Geometry, English, Social Studies, Problem Solving, Interpersonal Skills, Employability Skills, Critical-Thinking Skills, SCANS (Secretary's Commission on Achieving Necessary Skills), MAVCC, Chamber of Commerce, Colleges, Universities, Technology Centers, and Employment Agencies

MASONRY II

STANDARD 2.0

Students will take personal responsibility for the safety of themselves, their coworkers, and bystanders.

LEARNING EXPECTATIONS

The student will:

- 2.1** Exhibit and encourage in others a positive attitude regarding safety practices and issues.
- 2.2** Habitually inspect and use appropriate personal protective equipment for assigned tasks.
- 2.3** Inspect, maintain, and employ safe operating procedures with tools and equipment, such as lifting equipment, scaffolding, and rigging equipment.
- 2.4** Exhibit a well-developed awareness of potential hazards to themselves and others.
- 2.5** Carry out responsibilities under HazCom (Hazard Communication) regulations.
- 2.6** Take action to protect coworkers and bystanders from hazards as required by regulations and Occupational Safety and Health Administration (OSHA) policies.
- 2.7** Report accidents and observed hazards and execute emergency response procedures as required by regulations and Occupational Safety and Health Administration (OSHA) policies.
- 2.8** Demonstrate appropriate related safety procedures.
- 2.9** Pass with 100 % accuracy a written examination relating specifically to masonry safety issues.
- 2.10** Pass with 100% accuracy a performance examination relating specifically to masonry tools and equipment safety.
- 2.11** Maintain a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 2.1A** Includes safety procedures in activity plans.
- 2.1B** Exhibits an awareness of proper safety procedures by coworkers.
- 2.1C** Responds positively to instruction, advice, and correction regarding safety issues.
- 2.1D** Reports to school or work physically ready to perform to professional standards, such as rested, or not impaired by medications, drugs, alcohol.
- 2.2** Selects, inspects, and uses the correct personal protective equipment for the assigned task.
- 2.3A** Uses disconnect switches and lockout/tagout procedures.
- 2.3B** Inspects extension cords for the presence of a functional ground connection prior to use.
- 2.4A** Is observant of personnel and activities in the vicinity of the work area.
- 2.4B** Warns nearby personnel prior to starting potentially hazardous actions.
- 2.5A** Applies information from material safety data sheets (MSDS) to protect self and others from the health hazards associated with assigned tasks.
- 2.5B** Reports hazards found on the job site to the supervisor and remedies the hazard as instructed.
- 2.6A** Anticipates and warns bystanders when using air and powder actuated drivers.
- 2.6B** Provides and activates adequate ventilation equipment as required by the task.
- 2.7A** Reports all injuries and observed unguarded hazards to the immediate supervisor.
- 2.7B** Executes assigned tasks as described in emergency response procedures.
- 2.8A** Is observant of safety issues and concerns relevant to the construction industry.

- 2.8B** Complies with all safety guidelines and regulations set forth by industry and Occupational Safety and Health Administration (OSHA).
- 2.9** Passes with 100 % accuracy a written examination relating specifically to masonry safety issues.
- 2.10** Passes with 100% accuracy a performance examination relating specifically to masonry tools and equipment safety.
- 2.11** Maintains a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Prior to assigning a task using power tools, the instructor removes some required safety items and instructs students to perform an inspection of tools.
- Instruct a visitor to obviously approach the vicinity of a student conducting a hazardous activity and note the level of awareness demonstrated by the student.
- In a project requiring solvents or adhesives, introduce a new brand or type and require students to retrieve the material safety data sheets (MSDS) and identify possible health hazards.

INTEGRATION/LINKAGES

SkillsUSA, Science, Computer Skills, Research and Writing Skills, Language Arts, Communication Skills, Leadership Skills, Teamwork Skills, Algebra, Geometry, English, Secretary's Commission on Achieving Necessary Skills (SCANS), Associated Builders and Contractors (ABC), Associated General Contractors (AGC), MAVCC, National Center for Construction Education and Research (NCCER), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency, United States Department of Labor, Tennessee Department of Labor and Workforce Development

MASONRY II

STANDARD 3.0

Students will interpret, lay out, and fabricate in conformance to construction drawings and written specifications.

LEARNING EXPECTATIONS

The student will:

- 3.1** Interpret information on residential plans.
- 3.2** Estimate material quantities from plans and drawings.
- 3.3** Interpret dimensions and scales on drawings.
- 3.4** Explain the organization of residential plans and drawings.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 3.1** From a plan, calculates the square footage of one elevation, including openings.
- 3.2A** Estimates the amount of brick and mortar from that same elevation.
- 3.2B** Estimates the size and number of lintel block for that same elevation.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Given a set of plans and specifications for a residential or a commercial structure, make a complete material take-off for the masonry components.
- Given a set of plans and specifications for a residential or a commercial structure, determine the location of masonry elements not explicitly dimensioned.

INTEGRATION/LINKAGES

SkillsUSA, Science, Computer Skills, Research and Writing Skills, Language Arts, Communication Skills, Leadership Skills, Teamwork Skills, Algebra, Geometry, English, Secretary's Commission on Achieving Necessary Skills (SCANS), Associated Builders and Contractors (ABC), Associated General Contractors (AGC), MAVCC, National Center for Construction Education and Research (NCCER), Occupational Safety and Health Administration (OSHA), United States Department of Labor, Tennessee Department of Labor and Workforce Development

MASONRY II

STANDARD 4.0

Students will explain requirements for construction of residential foundations.

LEARNING EXPECTATIONS

The student will:

- 4.1** Lay out and build steps, patios, and decks made from masonry units.
- 4.2** Explain the requirements for construction of various types of residential foundations.
- 4.3** Identify and explain the characteristics, uses, and installation techniques for brick pavers.
- 4.4** Lay out and build chimneys and fireplaces.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 4.1A** Lays out and constructs a set of steps with three risers.
- 4.1B** Lays out and constructs a 5-foot by 7-foot brick patio section.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

INTEGRATION/LINKAGES

SkillsUSA, Science, Computer Skills, Research and Writing Skills, Language Arts, Communication Skills, Leadership Skills, Teamwork Skills, Algebra, Geometry, English, Secretary's Commission on Achieving Necessary Skills (SCANS), Associated Builders and Contractors (ABC), Associated General Contractors (AGC), MAVCC, National Center for Construction Education and Research (NCCER), Occupational Safety and Health Administration (OSHA), United States Department of Labor, Tennessee Department of Labor and Workforce Development

MASONRY II

STANDARD 5.0

Students will identify and describe ingredients of grout and types of grout used in masonry work.

LEARNING EXPECTATIONS

The student will:

- 5.1** Place grout in a hollow block wall and rod it into place.
- 5.2** Apply grout in low and high lifts using the proper techniques.
- 5.3** Name and describe the primary ingredients in grout and their properties.
- 5.4** Identify the types of grout used in masonry work.
- 5.5** Describe the common admixtures and their uses.
- 5.6** Describe the use of steel bar reinforcement in masonry construction.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 5.1** Places grout in a hollow block wall and rod in place.
- 5.2** Pours grout for a two-lift pour.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

INTEGRATION/LINKAGES

SkillsUSA, Science, Computer Skills, Research and Writing Skills, Language Arts, Communication Skills, Leadership Skills, Teamwork Skills, Algebra, Geometry, English, Secretary's Commission on Achieving Necessary Skills (SCANS), Associated Builders and Contractors (ABC), Associated General Contractors (AGC), MAVCC, National Center for Construction Education and Research (NCCER), Occupational Safety and Health Administration (OSHA), United States Department of Labor, Tennessee Department of Labor and Workforce Development

MASONRY II

STANDARD 6.0

Students will demonstrate metal work in masonry.

LEARNING EXPECTATIONS

The student will:

- 6.1** Install hollow metal frames.
- 6.2** Describe functions of and install sills and lintels.
- 6.3** Install metal hardware.
- 6.4** Describe the uses and installation of vertical reinforcement.
- 6.5** Describe the uses and installation of different types of horizontal joint reinforcements and ties.
- 6.6** Describe the uses and installation of different anchors, fasteners, and embedded items.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 6.1** Installs a knockdown door frame in a 2- or 3- course brick wall.
- 6.2** Installs a slip sill.
- 6.3** Installs hardware cloth unit ties in every other course.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

INTEGRATION/LINKAGES

SkillsUSA, Science, Computer Skills, Research and Writing Skills, Language Arts, Communication Skills, Leadership Skills, Teamwork Skills, Algebra, Geometry, English, Secretary's Commission on Achieving Necessary Skills (SCANS), Associated Builders and Contractors (ABC), Associated General Contractors (AGC), MAVCC, National Center for Construction Education and Research (NCCER), Occupational Safety and Health Administration (OSHA), United States Department of Labor, Tennessee Department of Labor and Workforce Development

MASONRY II

STANDARD 7.0

Students will recognize and demonstrate advanced laying techniques.

LEARNING EXPECTATIONS

The student will:

- 7.1 Build various types of walls using proper reinforcement, jointing and bonding techniques.
- 7.2 Lay out a semicircular arch and jack arch.
- 7.3 Recognize the requirement for and function of control joints and expansion joints.
- 7.4 Recognize the structural principles and fundamental uses of basic types of walls.
- 7.5 Lay out specialty structures such as maintenance holes, segmented block walls and screens.
- 7.6 Identify and explain the different types of masonry arches used today.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 7.1 Lays a wythe of brick against a block wythe or wood frame to make a composite wall. Uses ties and a collar joint.
- 7.2 Lays out specialty structures and arches.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

INTEGRATION LINKAGES

Science, Computer Skills, Research and Writing Skills, Language Arts, Communication Skills, Leadership Skills, Teamwork Skills, English, Secretary's Commission on Achieving Necessary Skills (SCANS), SkillsUSA, SkillsUSA *Professional Development Program* (PDP), SkillsUSA *Total Quality Curriculum*, Associated Builders and Contractors (ABC), Associated General Contractors (AGC), MAVCC, National Center for Construction Education and Research (NCCER), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency, United States Department of Labor and Workforce Development, Tennessee Department of Labor and Workforce Development

MASONRY II

STANDARDS 8.0

Students will identify construction techniques and moisture control.

LEARNING EXPECTATIONS

The student will:

- 8.1** Construct corbelling in a double-wythe wall.
- 8.2** Join intersecting walls.
- 8.3** Install flashing.
- 8.4** Explain and demonstrate techniques for constructing masonry around windows, doors, and other openings.
- 8.5** Explain the requirements for wall bracing and demonstrate the techniques used to construct pilasters and other types of bracing.
- 8.6** Identify the various types of insulation used in conjunction with masonry construction, and explain installation techniques.
- 8.7** Identify the need for moisture control in various types of masonry construction and demonstrate the techniques used to eliminate moisture problems.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 8.1** Constructs a four-course corbel starting at the fifth course of a double-wythe wall.
- 8.2** Constructs an intersecting block wall joined with wire mesh or metal lath.
- 8.3** Installs a row of flashing in an anchored veneered wall.

SAMPLE PERFORMANCE TASKS

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MASONRY II

STANDARD 9.0

Students will describe construction inspection and quality control.

LEARNING EXPECTATIONS

The student will:

- 9.1** Describe industry standards for quality control.
- 9.2** Describe how to build masonry sample panels and prisms.
- 9.3** Perform a slump test.
- 9.4** Describe and perform field inspections.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 9.1** Describes industry standards for quality control.
- 9.2** Describes how to build masonry sample panels and prisms.
- 9.3** Performs a slump test.
- 9.4** Describes and performs field inspections.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion

INTEGRATION LINKAGES

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MASONRY II

SAMPLING OF AVAILABLE RESOURCES

- *Core Curriculum*, National Center for Construction Education and Research (NCCER), Prentice Hall, Upper Saddle River, NJ; ©2000. Also known as the “Wheels of Learning” materials.
- *Masonry Level One*, National Center for Construction Education and Research (NCCER), Prentice Hall, Upper Saddle River, NJ; ©1996. Also known as the “Wheels of Learning” materials.
- *Masonry Level Two*, National Center for Construction Education and Research (NCCER), Prentice Hall, Upper Saddle River, NJ; ©1999. Also known as the “Wheels of Learning” materials.
- *Masonry Level Three*, National Center for Construction Education and Research (NCCER), Prentice Hall, Upper Saddle River, NJ; ©1999. Also known as the “Wheels of Learning” materials.
- *Reinforced Masonry Engineering Handbook*, James E. Amrhein, Masonry Institute of America, Second Edition; ©1972, 1973.
- *Structural Analysis for Engineering Technology*, Jack D. Bakos, Jr., Charles E. Merrill Publishing Company, Columbus, OH; ©1973.
- *Structural Design Guide to the ACI Building Code*, Paul F. Rice, et. al., Van Nostrand Reinhold Company, New York, NY; ©1985.
- *Concrete and Cement Masonry, Year I*, MAVCC, Oklahoma Department of Career and Technology Education
- *Concrete and Cement Masonry, Year II*, MAVCC, Oklahoma Department of Career and Technology Education
- *Introduction to Bricklaying*, MAVCC, Oklahoma Department of Career and Technology Education
- *Brick and Block Masonry*, MAVCC, Oklahoma Department of Career and Technology Education
- *Fundamentals of Bricklaying*, MAVCC, Oklahoma Department of Career and Technology Education
- *Stone Masonry, Panel, and Tile Installation*, MAVCC, Oklahoma Department of Career and Technology Education

- *Concrete, Masonry and Brickwork: A Practical Handbook for the Home Owner and Small Builder*, U. S. Department of the Army, Dover Publications, Inc., August 1999.
- *Masonry and Concrete*, C. Beall, McGraw-Hill Professional Book Group, August 2000.
- *Modern Masonry*, Clois E. Kicklighter, Goodheart-Willcox, 2003
- *Modern Masonry, Job Practice Manual*, Clois E. Kicklighter, Goodheart-Willcox, 2003
- *Total Quality Curriculum*, National SkillsUSA, www.skillsusa.org
- Professional Development Program, National SkillsUSA, www.vica.org
- American Concrete Institute International, <http://www.aci-int.org/>
- American Society for Testing and Materials, <http://www.astm.org/>
- Building Officials and Code Administrators International, <http://www.bocai.org>
- International Union of Bricklayers and Allied Craft Workers, www.bacweb.org
- Concrete Masonry Online, National Concrete Masonry Association, www.ncma.org
- Power Tool Institute (PTI), www.powertoolinstitute.com
- Occupation Safety and Health Administration (OSHA), www.osha.gov
- National Skills Standards Board Institute, <http://www.nssb.org>
- Vocational Information Center, <http://www.khake.com/index.html>
- Secretary's Commission on achieving Necessary Skills, <http://www.dol.gov>
- U. S. Department of Labor, Occupational Outlook Handbook, <http://stats.bls.gov/oco/home.htm>
- Environmental Protection Agency (EPA), <http://www.epa.gov>