

Course Outlines

HELP EXIT

Fall 2009
May 28, 2009



Official Yavapai College Course Outlines listed below.

RBT 103 - Basic Home Remodeling

COURSE DESCRIPTION:

RBT103. Basic Home Remodeling (3). Basic remodeling from design to completion. Everything to design, permit, contract, manage and construct small, residential remodels. Field trips required. Prerequisite: Reading Proficiency. Two lecture. Three lab.

COURSE CONTENT:

1. Remodel concepts and designs
2. Building permit requirements
3. Building code requirements
4. Material selection
5. Estimating project costs
6. Bidding the job with subcontractors and suppliers
7. Managing the project
8. Various skill units, e.g., framing, electrical, plumbing, drywall, painting

LEARNING OUTCOMES:

1. Develop concepts and designs for remodeling project (1)
2. Apply for a building permit (2)
3. Estimate and bid the cost of a small remodeling project (4,5,6)
4. Arrange contracts with subcontractors and suppliers (6)
5. Schedule and manage a small remodeling project (1-8)
6. Appraise which building trades are needed to complete a remodeling project (3,6,7,8)

3.000 Credit Hours

2.000 Lecture hours

3.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, Lab, Lecture, Lecture/Lab

Yavapai College
Career and Technical Education Division
Building Technology Department

RBT 105 - Be Your Own Contractor

COURSE DESCRIPTION:

RBT105. Be Your Own Contractor (3). Maximize your building experience while minimizing your anguish. From permitting to completion, including site and house

selections, choosing subs and suppliers, estimating and scheduling the entire project. Prerequisite: Reading Proficiency. Three lecture.

COURSE CONTENT:

1. Building Permit Requirements
2. Building Code Requirements
3. Zoning Requirements
4. Utility Requirements
5. Local, State and Federal tax Requirements
6. Site selection
7. Plan selection
8. Estimating & bidding the costs
9. Contracting with subcontractors
10. Scheduling and project management
11. Employer regulations
12. Environmental and Safety requirements

LEARNING OUTCOMES:

1. Apply for a building permit (1-3, 4, 6, & 7)
2. Locate a house plan on a lot (3, 4, 6 & 7)
3. Estimate and bid the cost of building a house (5, 7 - 9)
4. Select contracts with subcontractors and suppliers (8 & 9)
5. Schedule and manage a house building project (9 & 12)

3.000 Credit Hours

3.000 Lecture hours

0.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, Lecture

Yavapai College

Career and Technical Education Division

Building Technology Department

RBT 110 - Residential Building I

COURSE DESCRIPTION:

RBT110. Residential Building I (9). Progressive and innovative residential building for the 21st century. Includes the use of building materials, systems, and technologies to build healthy, safe, durable, comfortable, environmentally responsive houses. Prerequisite: Reading Proficiency. Three lecture. Eighteen lab.

COURSE CONTENT:

1. Jobsite safety and tool use
2. Building Site
3. Drawings and documents
4. Building codes, permits, inspections, and utilities
5. Building science principles and practices

6. Foundation and water management
7. Building enclosure
8. Roofing

LEARNING OUTCOMES:

1. Implement jobsite safety practices and correct tool use (1)
2. Apply building-science principles to mainstream construction practices (5)
3. Construct a house through the dry-in stage (1-8)
 - a. Select building site and orientation (2)
 - b. Read and interpret drawings and documents (3)
 - c. Apply for permit, call for building inspections for code compliance (4)
 - d. Construct an insulated and damp-proofed foundation (6)
 - e. Construct an efficient floor, wall, and roof assembly (7)
 - f. Select and install roofing materials (8)

9.000 Credit Hours

3.000 Lecture hours

18.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, Lab, Lecture, [Lecture/Lab](#)

Yavapai College

Career and Technical Education Division

Building Technology Department

RBT 111 - Residential Technology I

COURSE DESCRIPTION:

RBT111. Residential Technology I (4). Layout a building, rough-in utilities, and select building materials, systems and technologies using the whole systems approach. Prerequisite: Reading Proficiency. Four lecture.

COURSE CONTENT:

1. Sustainable/Green Building principles and practices
2. Building science principles applied to mainstream construction practices
3. Site orientation, storm-water management, and landscaping considerations
4. Working drawings of construction details, and written specifications and documents
5. Building permits, codes, and blue staking
6. Site work, clearing, and rough grading
7. Excavation, footings, utility trenches, and septic systems
8. Temporary and permanent utilities; water, electric, phone, TV cable, septic, toilet rough-in
9. Plumbing and electrical; temporary utilities rough-in
10. Foundation: concrete, steel, wood, masonry, ICF's, damp proofing and water management
11. Framing: floors, walls and roof
12. Roofing materials and finishes

13. Window and exterior door selections and installation
14. Flashing and moisture barrier (drainage plane)

LEARNING OUTCOMES:

1. Select and apply sustainable/green building and building science principles and practices. (1)
2. Interpret and apply appropriate healthy house design and building strategies. (1,2)
3. Secure a building permit to install temporary and permanent utilities. (5)
4. Read and interpret architectural working drawings, written specifications, and construction documents. (4)
5. Prepare a plan for laying out a house on a building site. (6)
6. Develop a strategy for clearing a lot and excavation of footings and utility trenches. (6,8,9)
7. Produce a plan for laying out footings and foundation building lines. (10)
8. Prepare a plan for excavating footings, installing rebar, footing inspection, and pouring concrete footings. (7)
9. Develop a drawing for constructing foundation stem walls, and placing concrete flatwork/slabs. (10)
10. Select and discuss the benefits of installing foundation damp-proofing materials, French drain tile with sock, and drainage board for around foundation for effective water-management control. (10)
11. Select, compare and contrast climate-specific building materials, systems and technologies to be used in residential construction. (1,2)
12. Discuss methods for estimating and tracking time, materials and labor as it relates to building a house. (4)
13. Identify and discuss the advantages of advanced framing techniques to construct wood floors. (11)
14. Identify and discuss the advantages of advanced framing techniques to construct wood and steel frame walls. (11)
15. Identify and discuss the advantages of advanced framing techniques to construct wood ceilings and roofs. (11)
16. Identify potential thermal by-passes in the framing. (11)
17. Identify truss types and discuss the benefits of installing trusses with energy heels. (11)
18. Follow and interpret pertinent 2006 IRC building codes, statutes and rules to residential construction. (5)
19. Outline the required building inspections. (5)
20. Discuss the details involved in energy efficient construction and techniques used in constructing a high-performance house. (1-14)
21. Develop a plan for installing house wrap, windows, doors, flashings, and rigid insulation sheathing. (13)
22. Select, compare and contrast roofing material. (12)

4.000 Credit Hours
4.000 Lecture hours
0.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, [Lecture](#)

Yavapai College
Career and Technical Education Division
Building Technology Department

RBT 112 - Construction Drawings and Documents

COURSE DESCRIPTION:

RBT112. Construction Drawings and Documents (3). Reading and understanding of residential construction documents including architectural plans, specifications, and construction working drawings. Three lecture.

COURSE CONTENT:

1. Introduction to the IRC (International Residential Code) Chapter 3
2. Introduction to the IECC (International Energy Conservation Code)
3. Architectural & Engineering Scales
4. Architectural Terminology
5. Orthographic Projection
6. Complete sets of architectural drawings for residential construction
7. Truss Calculations
8. Engineered Floor Calculations
9. Beam & Floor Load formulas
10. Introduction to Braced Wall Panels
11. Material Schedules

LEARNING OUTCOMES:

1. Identify types of plans, alphabet of lines, drawing notations, and architectural symbols. (3-8)
2. Use an architectural or engineering scale to read and mark off print dimensions. (3, 6)
3. Identify specific construction items from material schedules. (6, 11)
4. Use engineering formulas to calculate various types of beam and floor loads. (9)
5. Interpret various residential construction drawings. (4-8, 10)
6. Explain the basics of braced wall panel placement in a simple single-family dwelling. (6 & 10)
7. Apply basic code requirements for a single-family dwelling. (1-2)

3.000 Credit Hours
3.000 Lecture hours
0.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, [Lecture](#)

Yavapai College
Career and Technical Education Division
Building Technology Department

RBT 113 - Residential Graphics I

COURSE DESCRIPTION:

RBT113. Residential Graphics I (4). Fundamentals of residential architectural drafting, including introduction to equipment, lettering, basic drawing concepts, minimum code requirements and structural design criteria. Emphasis on producing a partial working set of two-dimensional drawings for a single family dwelling, including site, floor and foundation plans. Prerequisite: Reading Proficiency. Three lecture. Three lab.

COURSE CONTENT:

1. Drafting equipment and its uses
2. Lettering
3. Dimensioning
4. Sketching
5. Plan drawings
6. Orthographic projection drawings
7. Reproduction of plans
8. Basics of residential working drawings
9. Basic load calculations
10. Application of current codes - IRC (International Residential Code) & IECC (International Energy Conservation Code)
11. Truss and engineered floor calculations

LEARNING OUTCOMES:

1. Use architectural drafting tools, symbols and plan types to produce residential architectural drawings. (1-8)
2. Utilize drafting skills in the production of residential architectural plans. (1-8)
3. Produce a partial working set of drawings for a single-family dwelling ? Site Plan, Floor Plan, Foundation Plan, Floor and Roof Framing Plans. (1-11)
4. Apply current codes and load requirements to residential working drawings. (9-11)

4.000 Credit Hours

3.000 Lecture hours

3.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, Lab, Lecture, [Lecture/Lab](#)

Yavapai College

Career and Technical Education Division

Building Technology Department

RBT 114 - Autocad I

COURSE DESCRIPTION:

RBT114. AutoCAD I (3). Introduction to theory and application of computer-aided drafting for production of residential working drawings. Two lecture. Three lab.

COURSE CONTENT:

1. AutoCAD software configuration/operation procedure
2. AutoCAD software
3. Starting an AutoCAD 2-D drawing
4. Adding objects
5. 2-D input, output and file management
6. Modifying a 2-D drawing
7. 2-D groups and windows
8. Advanced functions

LEARNING OUTCOMES:

1. Install AutoCAD software. (2)
2. Identify the principle operating components of AutoCAD hardware/software. (1,2)
3. Use AutoCAD commands to: (2-7)
 - a. Setup and use drawing aids
 - b. Save drawings and get help
 - c. Draw and erase lines
 - d. Draw basic shapes
 - e. Perform geometric construction and object snap
 - f. Drawing display options
 - g. Place text in a drawing
 - h. Perform basic editing commands
 - i. Create multiple entities
 - j. Perform basic dimensioning.
4. Use the AutoCAD software to create a multi-layered residential construction drawing. (8)
5. Create a set of residential blueprints. (8)
 - a. Floor plans
 - b. Elevations

3.000 Credit Hours

2.000 Lecture hours

3.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, Lab, Lecture, [Lecture/Lab](#)

Yavapai College

Career and Technical Education Division

Building Technology Department

RBT 121 - Residential Building II

COURSE DESCRIPTION:

RBT121. Residential Building II (9). Progressive and innovative residential building for the 21st century. Includes the use of building materials, systems and technologies to build healthy, safe, durable comfortable, environmentally

responsive houses from dry-in to commission/certification. Prerequisite: Reading Proficiency. Three lecture. Eighteen lab.

COURSE CONTENT:

1. Jobsite safety and tool use
2. Building science principles and practices
3. Building codes, permits, and inspections
4. Interior building enclosure elements
5. Heat, air and moisture barriers
6. HVAC mechanical systems
7. Plumbing and electrical subsystems
8. Interior fit and finish
9. Exterior finishes
10. Concrete flatwork
11. Commissioning and testing

LEARNING OUTCOMES:

1. Apply jobsite safety practices and tool use. (1)
2. Apply building-science principles to mainstream construction practices. (2)
3. Complete the construction of a house. (1-11)
 - a. Comply with local building codes and required inspections. (3)
 - b. Select, construct and/or install interior building enclosure elements. (4)
 - c. Select and install heat, air and moisture barriers. (5)
 - d. Select HVAC systems and assist subcontractor with the installation. (6)
 - e. Select plumbing fixtures and electrical finishes and assist subcontractors with installation. (7)
 - f. Select interior fit and finish materials: appliances, cabinets, flooring, lighting and assist the subcontractor(s) with the installation(s). (8)
 - g. Select and install exterior finishes. (9)
 - h. Place concrete flatwork (10)
 - i. Test and commission the house for certification. (11)
 - j. Call for final inspection to acquire Certificate of Occupancy. (3-11)

9.000 Credit Hours

3.000 Lecture hours

18.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, Lab, Lecture, Lecture/Lab

Yavapai College

Career and Technical Education Division

Building Technology Department

RBT 122 - Residential Technology II

COURSE DESCRIPTION:

RBT122. Residential Technology II (4). Interior and exterior residential building finish processes beyond rough framing and dry-in. Emphasis on the construction

process and the responsibilities of each building trade/subcontractor. Integration of current building-science principles into mainstream residential construction practices. Prerequisite: Reading Proficiency. Four lecture.

COURSE CONTENT:

1. Exterior finishes
2. Paint-exterior and interior
3. Decks/porches
4. Masonry and concrete flatwork
5. Mechanical systems
6. Commissioning
7. Solar hot water
8. Insulation types and installation
9. Barriers: air, moisture, thermal
10. Interior finishes
11. Drywall
12. Flooring finishes
13. Plumbing rough, grey water plumbing
14. Electrical rough, structured wiring
15. Cabinet: selection and installation
16. Energy-efficient lighting
17. Energy-efficient appliances
18. IAQ-indoor air quality
19. Landscaping/xeriscaping
20. Sustainable/green building strategies
21. Environmentally friendly building materials, products and building strategies
22. Rain-water catchment
23. EnergyStar, Environments for Living
24. Building science principles and practices
25. Roofing materials and installation
26. Windows and exterior doors
27. Building codes and inspections
28. Working drawings and construction documents
29. Estimating time, materials and labor
30. Advanced wood framing

LEARNING OUTCOMES:

1. Solar and renewable energy systemsRead and interpret residential specifications and drawings. (27)
2. Apply pertinent building codes. (28)
3. Select building materials and products to be used in the construction of responsive house. (21)
4. Apply building strategies to sustainable/green. (20)
5. Estimate time, material, and labor costs. (29)
6. Schedule labor and delivery of materials. (29)
7. Integrate optimal value engineering techniques and strategies. (24)
8. Apply building science principles to mainstream construction practices. (24)
9. Choose subcontractors based on bids and estimates. (29)
10. Place concrete for slab-on grade, footings, foundation stem walls, driveway,

- stoop, steps, and sidewalks. (4)
11. Select and install dimensional and engineered lumber. (3)
 12. Select air, moisture/weather, and thermal vapor barriers. (9)
 13. Select finish roofing materials. (25)
 14. Select high-performance windows and doors, housewrap and flashing. (9,26)
 15. Select exterior wall finishes. (1,3)
 16. Select HVAC systems, filters, and fresh air ventilation equipment. (5)
 17. Seal the duct system with mastic. (5)
 18. Test structures for air leakage and thermal bypasses. (6)
 19. Wire the house for electricity and home automation. (14)
 20. Select water efficient plumbing fixtures. (13)
 21. Air seal to eliminate thermal bypasses. (9,30)
 22. Select insulation material. (8)
 23. Create an interior air barrier using drywall. (11)
 24. Choose environmentally friendly paints, caulks, adhesives, and glues. (21)
 25. Select sustainable and healthy floor coverings. (12)
 26. Select cabinets. (21)
 27. Select interior trim, hardware, and plumbing accessories (10,15)
 28. Select closet shelving. (10)
 29. Identify techniques and materials used to build decks that are low maintenance, durable, and use recycled materials. (3)
 30. Select Energy Star certified lighting fixtures and appliances. (5,16,17)
 31. Select solar tubes to provide natural daylighting. (31)
 32. Use ES IAQ checklist to guide the design and construction of a healthy house. (18)
 33. Select rain-water catchment, grey water plumbing, and solar hot water systems. (7,22)
 34. Choose native plants. (19)
 35. Describe the advantages of conserving energy, water and building resources. (20,21,23,24,30,31)

4.000 Credit Hours
4.000 Lecture hours
0.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, Lecture

Yavapai College
Career and Technical Education Division
Building Technology Department

RBT 123 - Estimating and Bidding

COURSE DESCRIPTION:

RBT123. Estimating and Bidding (3). Fundamental principles and practices of residential construction estimating and bidding. Includes reading working drawings and written specifications to produce material quantity take-offs, estimate labor

time and costs, and assess overhead costs and profit margins. Emphasis is on computer-assisted cost estimating. Prerequisite: RBT 112. Reading Proficiency. Three lecture.

COURSE CONTENT:

1. Elements of an estimate
2. Mathematics for the estimator
3. Quantity take off techniques for various construction phases
4. Pricing techniques used in estimating construction costs
5. Labor, materials and equipment estimates
6. General expenses, overhead and profit markups
7. Computer-assisted construction cost estimating
8. Estimating and bidding forms

LEARNING OUTCOMES:

1. Create quantity take offs for various construction phases, tasks, and activities. (1-3)
2. Use standard construction industry techniques to price an estimate. (3-6)
3. Assess general expenses and overhead costs and determine profit margins to include in a cost proposal. (6)
4. Input quantity and cost data into computer applications to derive a project cost. (7)
5. Formulate cost estimates for various types of residential construction projects. (7-8)

3.000 Credit Hours

3.000 Lecture hours

0.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, Lecture

Yavapai College

Career and Technical Education Division

Building Technology Department

RBT 125 - Residential Graphics II

COURSE DESCRIPTION:

RBT125. Residential Graphics II (4). Advanced drafting skills to complete a set of working drawings for a single-family dwelling. Included is a project to design a new residence and draft preliminary working drawings. Prerequisite: RBT 113. Reading Proficiency. Three lecture. Three lab.

COURSE CONTENT:

1. Basic residential architectural design elements
2. Sketching
3. Detail drawings
4. Wall sections

5. Framing and soundation structural details
6. Plan drawings
7. Plumbing isometric drawings
8. Introduction to braced wall panel requirements
9. Code design concepts - IRC (International Residential Code) & IECC (International Energy Conservation Code)

LEARNING OUTCOMES:

1. Utilize advanced drafting and design skills in the production of residential architectural plans. (1-9)
2. Complete a working set of drawings for a single-family dwelling. (3-9)
3. Describe the code requirements for Braced Wall Panels for a simple, single-family dwelling. (8)
4. Design a new residence and draft three (3) preliminary working drawings ? Site Plan, Floor Plan & Front Elevation. (1,2,6)

4.000 Credit Hours

3.000 Lecture hours

3.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, Lab, Lecture, Lecture/Lab

Yavapai College

Career and Technical Education Division

Building Technology Department

RBT 126 - Autocad II

COURSE DESCRIPTION:

RBT126. AutoCAD II (3). Advanced theory and application of computer-aided drafting for production of residential working drawings. Emphasis on using AutoCAD for advanced 2-dimensional design of site, foundation, floor and roof plans, elevations, building sections, and other working drawing details. Prerequisite: RBT 114. Two lecture. Three lab.

COURSE CONTENT:

1. Placing patterns in drawing objects
2. Inquiry commands
3. Placing text on a drawing
4. Introduction to dimensions
5. Placing dimensions on drawings
6. Block creation and enhancement
7. Oblique and isometric drawings
8. Multiple drawings
9. Combining drawings using XREF
10. Layouts and viewpoints
11. Sheet sets
12. Controlling output

LEARNING OUTCOMES:

1. Produce drawings such as site, foundation, floor, framing and roof plans, elevations, details, and sections. (1-12)
2. Edit an entire drawing to produce other similar drawings. (7,9)
3. Apply dimensioning methods and techniques. (3,4)
4. Place text with a drawing. (3)
5. Create varied text and dimensioning styles. (3,4)
6. Create symbol libraries to increase drawing speed and efficiency. (1)
7. Produce a complete set of residential working drawings. (1-12)

3.000 Credit Hours

2.000 Lecture hours

3.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, Lab, Lecture, Lecture/Lab

Yavapai College

Career and Technical Education Division

Building Technology Department

RBT 131 - International Residential Code

COURSE DESCRIPTION:

RBT131. International Residential Code (3). Overview of the regulations that govern the safety of residential construction. Using the International Residential Code and the International Energy Code (2006) as the basis for understanding building safety requirements. Includes the design, construction, use, occupancy, and location of residential dwellings. Prerequisite: Reading Proficiency. Three lecture.

COURSE CONTENT:

1. Administrative provisions and definitions
2. Building planning
3. Foundations and footings
4. Floor framing
5. Wall framing
6. Roof framing
7. Wall coverings and roofing
8. Chimneys and fireplaces
9. Energy efficiency
10. HVAC equipment
11. Plumbing installations
12. Electrical wiring
13. Building standards
14. Energy efficiency compliance

LEARNING OUTCOMES:

1. Explain the history and development of international residential code and reasons for their necessity. (1)

2. Use the terminology and language of the international residential code. (2-14)
3. Locate and reference specific international residential codes that apply to the design and construction of a residence. (2-14)
4. Request, from the appropriate building inspection department, required sequential inspections. (1)
5. Identify and apply appropriate residential codes and related procedures to the building design and construction. (2-14)
6. Apply energy-efficient code requirements to the construction of a residence. (9,14)

3.000 Credit Hours
3.000 Lecture hours
0.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, Lecture

Yavapai College
Career and Technical Education Division
Building Technology Department

RBT 151 - Residential Construction Contracting and Company Management

COURSE DESCRIPTION:

RBT151. Residential Construction Contracting and Company Management (3). Residential construction business techniques, skills, and conceptual tools for running an efficient and profitable construction business. Intended for future contractors, construction foremen, job supervisors, and project managers in residential construction. Prerequisite: Reading Proficiency. Three lecture.

COURSE CONTENT:

1. Types of business ownership
2. Company organization structures
3. Types of surety bonds in construction
4. Types of construction insurance
5. Business accounting methods
6. Business finances
7. Construction contracts
8. Project cost estimating, bidding and scheduling
9. Project management and administration
10. Project safety practices
11. Managing employees, subcontractors and customers
12. Software for the construction industry

LEARNING OUTCOMES:

1. Distinguish between different types of business ownerships and select one that is best suited to your business needs. (1, 2)
2. Develop a company organizational structure. (2)
3. Determine essential and mandated insurance and bond needs for one's own

selected type of business ownership. (3-4)

4. Analyze and use a variety of standard residential estimating and bidding documents. (5-8)
5. Analyze and use standard business financial forms. (5-6)
6. Analyze and use various project scheduling charts. (9, 11, 12)
7. Differentiate between various types of construction contracts. (7)
8. Assess appropriate software programs to use in construction accounting, financial record keeping, estimating and project management. (5, 6, 8, 9, 12)
9. Describe a project safety plan for a construction business. (10)

3.000 Credit Hours

3.000 Lecture hours

0.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, [Lecture](#)

Yavapai College

Career and Technical Education Division

Building Technology Department

RBT 152 - Project Management and Scheduling

COURSE DESCRIPTION:

RBT152. Project Management and Scheduling (3). Project management to achieve consistent construction project success. Includes challenges of tight budgets, contracted deadlines, defined resources, and personnel management on residential construction projects. Use of computer project scheduling tools to create bar charts and schedules. Prerequisite: RBT 151 or RBT 161. Reading Proficiency. Three lecture.

COURSE CONTENT:

1. Introduction to project management and project scheduling
2. Use of construction documents on the job site
3. Project planning, organizing, and scheduling
4. Computer scheduling and project management software
5. Critical Path Method and bar chart scheduling utilizing computer programs
6. Monitoring project schedules, construction costs and time constraints
7. Supervision and personnel management

LEARNING OUTCOMES:

1. Identify project requirements from construction plans, documents and specifications. (1, 2)
2. Plan a construction project from start to completion. (1-7)
3. Build a work breakdown structure (WBS), or bar chart, for a construction project. (3-4)
4. Build a critical path method (CPM) chart of a construction project. (5)
5. Create a project schedule using computer software. (4)
6. Adjust a project schedule to accommodate unexpected personnel, cost and

material changes. (3, 6 , 7)

3.000 Credit Hours

3.000 Lecture hours

0.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, [Lecture](#)

Yavapai College

Career and Technical Education Division

Building Technology Department

[RBT 161 - Construction Business Management](#)

COURSE DESCRIPTION:

RBT161. Construction Business Management (3). Fundamentals of business management for Arizona contractor license applicants. Preparation for the Arizona Registrar of Contractor's business management examination, including contract law, business ownership types, accounting fundamentals, employer obligations and business math. Prerequisite: Reading Proficiency. Three lecture.

COURSE CONTENT:

1. Planning and organizing a business
2. Business risk management
3. Construction project management
4. Business math
5. Arizona and Federal environmental and safety considerations
6. Arizona and Federal employer obligations
7. Financial management
8. Arizona contract law
9. Obtaining a contractor's license
10. Incorporating a business and registering a trade name
11. Arizona business taxes
12. Income tax regulations
13. Arizona mechanics lien law

LEARNING OUTCOMES:

1. Discuss the importance of a business plan when starting a new business. (1-2)
2. Identify the risks associated with construction contracting. (2, 3, 7, 10)
3. Choose the appropriate insurance policies and required bonding necessary to protect the contractor and customer. (2, 9)
4. Discuss job site environmental issues and safety. (5)
5. Interpret financial statements and contracts basic to managing a contracting business. (4, 7, 8)
6. Describe the steps to obtain a contractor's license. (9)
7. Discuss sales, payroll, and income taxes and their applicability to a construction business. (4, 6, 7, 11, 12)
8. Discuss the legal implications associated with the Arizona mechanic's lien law.

(13)

3.000 Credit Hours
3.000 Lecture hours
0.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, Lecture

Yavapai College
Career and Technical Education Division
Building Technology Department

RBT 231 - Solar and Renewable Energy

COURSE DESCRIPTION:

RBT231. Solar and Renewable Energy (3). Integration of solar and renewable energy into a "whole house system" design. Passive solar design including how to conserve energy and utilize renewable energy sources by responding to the local climate. Incorporating active solar, wind and geothermal technologies to generate power and improve energy efficiency. Prerequisite: Reading Proficiency. Three lecture.

COURSE CONTENT:

1. Solar energy strategies for building design
2. Passive and active systems
3. Daily, seasonal, and latitude dependent position of the sun
4. Direct, indirect and isolated solar gains
5. Sun charts
 - a. solar shading
 - b. insulation potential
6. Solar potential
7. Heating and cooling load
8. Thermal mass requirements for heat storage
9. Glazing requirements
10. Trombe wall, greenhouse/sunspace, interior mass storage systems
11. Hot water systems for domestic water and space heating/cooling
12. Flat plate collectors for air, water and photovoltaics
13. Photovoltaic systems overview
14. Electrical definitions
 - a. amps
 - b. watts
 - c. volts
 - d. amp/hours
 - e. AC
 - f. DC
15. PV solar modules
16. Battery systems

17. Wiring
 - a. inverters
 - b. charge controllers
18. Mounting collectors
19. Home power requirements, DC options, sizing systems
20. Wind and geothermal systems
21. Integration of energy systems and energy efficiency

LEARNING OUTCOMES:

1. Contrast and categorize solar systems: passive, active & tempered (2)
2. Identify and use passive solar design principles and techniques for residential design. (1,3,4,5)
3. Calculate solar shading. (3,5)
4. Analyze and evaluate solar potential at a building site. (6)
5. Analyze and calculate home energy requirements and solar energy contribution. (7-10)
6. Devise thermal storage strategy by design and site particulars. (10)
7. Describe the factors involved in solar solutions for building energy requirements. (1-9)
8. Size solar hot water systems based on insulation and hot water demand. (11)
9. Calculate energy gain from flatplate collector systems. (12)
10. Size and design photovoltaic collector system. (13-19, 21)
11. Formulate and describe battery system for PV arrays. (16)
12. Calculate loads and requirements for inverter and battery system. (17,19)
13. Describe wiring considerations for alternative systems. (13-17,19)
14. Compare alternative energy systems including wind and geothermal. (20)

3.000 Credit Hours

3.000 Lecture hours

0.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, [Lecture](#)

Yavapai College

Career and Technical Education Division

Building Technology Department

RBT 232 - Sustainable Design Green Building

COURSE DESCRIPTION:

RBT232. Sustainable Design/Green Building (3). Merging sustainable design principles and green building technologies into mainstream residential construction practices. Principles and practices to reduce negative environmental impacts on local and global scales while simultaneously improving building performance, health and comfort of the occupants. Prerequisite: Reading Proficiency. Three lecture.

COURSE CONTENT:

1. Introduction to sustainable design/green building and building performance -

whole building design process.

2. Community and Site Planning

- a. land development
- b. site planning
- c. construction waste management
- d. storm-water management
- e. pest management

3. Renewable energy - design with nature

- a. passive solar design strategies
- b. solar water heating systems
- c. solar photovoltaic strategies

4. Environmental and climate considerations in residential designs and construction

5. Building enclosure components

- a. Foundation / walls / floors / roof / exterior claddings / insulation and air sealing / windows and doors

6. Integration of building design, systems engineering, and commissioning - building as a system

7. Green building guidelines

- a. programs
- b. checklists
- c. resources

8. Building codes / international energy codes

9. Energy efficiency and performance

- a. HVAC mechanical systems
- b. lighting
- c. appliances

10. Fundamentals of heat, air and moisture flow; surface radiant temperatures

11. Efficient water use

- a. plumbing fixtures
- b. landscaping / xeriscape
- c. graywater plumbing
- d. rainwater catchment

12. Indoor environmental quality

13. Sustainable / green building materials

14. Building for performance and durability - case studies

LEARNING OUTCOMES:

1. Define sustainability, green building, and high-performance building. Also, explain the whole building-design concept. (1)
2. Analyze and interpret the building site(s) before designing a house, or a housing development, for environmental impact. (2)
3. Apply solar design systems and technologies to the design and/or construction of a house. (3)
4. Identify climate zones and discuss the climate-appropriate design and construction details. (4)
5. Describe the impact of the building enclosure in green building. (5)
6. Describe how a building works as a system. (6)
7. Design and/or build a sustainable/green house which incorporates the whole-systems approach that utilizes techniques to minimize environmental impact and

- also reduces the energy consumption of the building while contributing to the health of it's occupants. (7)
8. Apply pertinent energy codes to the design and/or construction of a house. (8)
 9. Select appropriate energy efficient HVAC systems, lighting, and appliances for a green-built house. (9)
 10. Describe the fundamentals of heat, air, and moisture flow with regard to the building enclosure. (10)
 11. Incorporate water management strategies into building and site design. (11)
 12. Select materials, systems, and technologies that enhance the quality of the indoor environment with fresh air, ventilation, nontoxic materials, and filtration. (12)
 13. Select resource-efficient materials, systems, and technologies which have minimum impact on the health of our environment and ourselves. (13)
 14. Build and/or design a low-energy, resource-efficient house that reduces utility costs, improves indoor environmental quality, and preserves the environment for future generations. (14)

3.000 Credit Hours

3.000 Lecture hours

0.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, [Lecture](#)

Yavapai College

Career and Technical Education Division

Building Technology Department

[RBT 233 - Alternative Building Materials and Design](#)

COURSE DESCRIPTION:

RBT233. Alternative Building Materials and Design (3). Survey of alternative designs, products, and methods of construction with an emphasis on efficient use of space, materials, and energy. Mainstream building designs, materials, systems, technologies, and methods of residential construction. Includes environmentally responsive design and building practices. Prerequisite: Reading Proficiency. Two lecture. Three lab.

COURSE CONTENT:

1. Building designs
2. Building systems
3. Building materials
4. Building technologies
5. Sustainable design strategies and practices
6. Green building practices
7. Healthy design and build strategies
8. Efficient use of resources
9. Resource conservation

10. Preservation of the natural and built environment

LEARNING OUTCOMES:

1. Integration of nature, technology, and humanity in to the built environment Identify and select building designs. (1)
2. Identify and select building systems. (2)
3. Identify and select building materials. (3)
4. Identify and select building technologies. (4)
5. Apply sustainable building design strategies to mainstream construction practices. (5)
6. Apply green building practices to the construction of a house. (6)
7. Apply healthy design/build principles to residential construction. (7)
8. Select and apply energy and resource efficient technologies. (8)
9. Evaluate ways to conserve precious resources. (9)
10. Identify ways to preserve the natural environment and build durable houses. (10)
11. Integrate human needs, nature, and technologies into the built environment. (11)

3.000 Credit Hours

2.000 Lecture hours

3.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, Lab, Lecture, [Lecture/Lab](#)

Yavapai College

Career and Technical Education Division

Building Technology Department

RBT 241 - Energy Efficient Building and Design

COURSE DESCRIPTION:

RBT241. Energy Efficient Building and Design (3). Optimizing energy efficiency using the "systems approach" to residential building and design. Includes air leakage and building-envelope tightness, insulation, ventilation, indoor air quality, energy efficiency, and comfort. Prerequisite: Reading Proficiency. Three lecture.

COURSE CONTENT:

1. Introduction to the "house as a system"
2. Heat-flow mechanics
 - a. BTU's
 - b. R-Values
 - c. calculating heat loos
3. Air flow
 - a. Infiltration, air-tightness, duct leakage
 - b. Basic thermal analysis
4. Moisture flow and indoor-air quality
 - a. Indoor mold causes and cures

5. Thermal analysis and thermal defects
 - a. Techniques for locating thermal defects
 - b. Heat-loss coefficients
 - c. Calculating auxiliary heating requirements
6. Foundation insulation
 - a. Crawlspace, basements, slab-on-grade heat-loss problems and solutions
 - b. Foundation water-management strategies
7. Attics and Walls Insulation
 - a. Insulation options
 - b. Typical thermal defects in the construction process
 - c. Water-management strategies in wall systems
8. Windows and Energy Efficiency
 - a. Window energy-performance ratings
 - b. Window heat-energy transfer mechanisms

LEARNING OUTCOMES:

1. Design energy efficient systems for use in residential construction. (1-8)
2. Analyze residential structures for thermal, moisture, and system effectiveness. (1,4,5)
3. Define common energy units, measures, and scales of efficiency. (2)
4. Apply design and building techniques to indoor air quality and the indoor environment. (3)
5. Apply the economics of energy efficiency to design and building. (1-8)

3.000 Credit Hours

3.000 Lecture hours

0.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, Lecture

Yavapai College

Career and Technical Education Division

Building Technology Department

RBT 242 - Weatherization for New and Existing Buildings

COURSE DESCRIPTION:

RBT242. Weatherization for New and Existing Buildings (3). Improving the energy efficiency, health, comfort and safety of new and existing homes. Includes energy audits, diagnostics, commissioning, certification, computerized energy modeling, and weatherization strategies. Prerequisite: Reading Proficiency. Three lecture.

COURSE CONTENT:

1. Introduction to Energy Ratings
2. Energy Efficient Mortgages
3. Loans for Energy Efficient Home Improvements
4. Principles of Energy
5. Energy Flows and the House as a System

6. Whole-House Weatherization
7. Telltale House
8. Energy and the Building Shell
9. Introduction to REM/Rate and Energy 10 Home Energy Analysis Tools
10. Introduction to Right Suite HVAC sizing software
11. Building Envelope Construction and Energy Flaws
12. Defining and Aligning the Thermal and Pressure Boundaries
13. Insulation
14. Windows and Doors
15. Air Flow and the Building Envelope
16. Measuring Air Flow with the Blower Door
17. Blower Door and Duct Blaster Testing
18. Heating Systems
19. Water Heating
20. Health and Safety
21. Lighting and Appliances
22. Solar Effects on Building Energy Flows
23. Cooling Principles and Equipment

LEARNING OUTCOMES:

1. Utility Rates Identify residential energy use and energy efficient ratings. (1-3,24)
2. Describe the physical principles for energy flows in residential buildings. (4,5,22,24)
3. Identify and describe energy flows through the building shell. (4,8)
4. Diagnose and calculate heat loss and gain through a building-shell. (6-9)
5. Design a building component as an air barrier to stop air leakage and infiltration. (9-12)
6. Select and install insulation to slow heat transmission through the building-shell. (13)
7. Select windows and doors to limit heat loss and gain while preserving natural light and view. (14-15)
8. Select a heating and cooling system that is designed to provide heat at roughly the same rate as it is being lost during worst-case outdoor temperatures. (10,16-18)
9. Use lighting principles and terminology. (21)
10. Select energy conservative and sealed combustion appliances. (21)
11. Develop a cooling strategy considering the building shell, landscaping, windows, and mechanical cooling systems. (23)
12. Select water-heating systems based on there energy use in three ways: demand, standby, and distribution. (19)
13. Analyze air flow and the impact on health and safety issues. (20)

3.000 Credit Hours
 3.000 Lecture hours
 0.000 Lab hours

Levels: Credit

Schedule Types: Additional Activity, Lecture

Yavapai College
Career and Technical Education Division
Building Technology Department

RBT 296 - Internship: Residential Building Technologies

COURSE DESCRIPTION:

RBT296. Internship: Construction and Building Technology (3). Supervised field experience with businesses, corporations, government agencies, schools and community organizations to expand career interests and apply subject knowledge relevant to the workplace. Individualized internship placements to develop personal and professional skills, including professional ethics, leadership, and civic responsibility. Prerequisite: Student must have a GPA of 2.0; have completed specific degree requirements as required by the program; and have completed the internship application process. [Repeatable for a total of 6 credit hours towards degree/certificate requirements.]

COURSE CONTENT:

1. Organizational overview of assigned placement
2. Integration of job description and organization's requirements
3. Elements of documentation of experience
4. Planning and time management
5. Professional, legal, and ethical issues
6. Communication, critical thinking, and problem solving
7. Specialized equipment, tools, and software required in the placement

LEARNING OUTCOMES:

1. Exhibit appropriate workplace behaviors and professional ethics.
2. Apply discipline specific knowledge and skills in the professional workplace.
3. Define and utilize technical terms in written and oral communications.
4. Use critical thinking, problem solving, ethical awareness, and effective writing
5. Interpret written and oral instructions.
6. Initiate and complete assigned responsibilities.
7. Maintain documentation required to comply with government employer or nonprofit agency regulations.
8. Use specialized equipment, software, and tools as required.
9. Analyze and interpret data for specified reports.
10. Identify opportunities for improvement in process and documentation related to the workplace.
11. Articulate job description and position in assigned organization.

REQUIRED ASSESSMENT:

1. Record of Student Internship workplace hours.
2. Individual Education Plan (IEP) as approved by supervision faculty.
3. A daily journal, or work log of tasks, including dates, descriptive comments, problems and solutions.
4. A reflective paper or project as specified by the supervision faculty.
5. A minimum of two evaluations by the workplace employer or supervisor.
6. Student's self-evaluation of experience.

3.000 Credit Hours
0.000 Lecture hours
0.000 Lab hours

Levels: Credit
Schedule Types: Internship

Yavapai College
Career and Technical Education Division
Building Technology Department

RBT 299 - Independent Study Residential Technology

COURSE DESCRIPTION:

RBT299. Independent Study Construction and Building Technology (1-6). Supervised special project in this field of study. Approval of supervising Division Dean is required.

COURSE CONTENT

1. Applied knowledge and skills
2. Learning objectives and competencies relevant to the discipline area and the community service setting
3. Critical analysis of the service-learning experience
4. Effective leadership, interpersonal, and writing skills
5. Evaluation and improvement of performance Demonstrate the ability to apply discipline-specific knowledge and skills to a community-service setting.
6. Develop the individual educational plan with the faculty liaison and agency/business.
7. Accomplish the specific learning objectives and competencies.

LEARNING OUTCOMES:

1. Demonstrate critical thinking, problem-solving, ethical awareness, and effective writing skills through discussions, a daily journal and an analytic paper.
2. Exhibit personal development and leadership foundation skills such as: acceptance of responsibility; self-confidence; respect for others and their views; social and interpersonal skills; initiative and follow-through.
3. Formulate a critical perception about civic responsibility, social problems, economic systems, cultural patterns, and policy issues.
4. Conduct a self-appraisal, evaluate the structured service-learning experience, and identify ways students may contribute to the local and regional needs of the community.

1.000 TO 6.000 Credit Hours
0.000 Lecture hours
0.000 Lab hours

Levels: Credit
Schedule Types: Independent Study

Yavapai College
Career and Technical Education Division
Building Technology Department

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