

Academic Affairs
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MEMORANDUM

TO: Academic Affairs Committee

FROM: Pat Toney
Vice President of Academic Affairs

DATE: October 4, 2010

RE: Academic Affairs Committee Meeting

The Academic Affairs Committee will meet as scheduled on Tuesday, October 12, 2010 at 2 p.m. in the Monk's Room.

The agenda is as follows:

1. Curriculum

Humanities Division

Course Revisions - ENG 095, ENG 096, ENG 100

Business & Technology Division

New Degree Option – Basic Engineering/Associate in Science/Biomedical Engineering Option

Curriculum Revision – Energy Utility Technology– EUT 101 Replace EUT 100

New Courses HVC 101, HVC 102, HVC 103, HVC 104, HVC 105

Course Description Revision – MNT 101

2. Policy Review

Core Curriculum

<http://www.qcc.mass.edu/PresidentsOffice/POLICIES/ADOBE%20POLICIES/version%20in%20adobe/Core%20Curriculum%20Policy.pdf>

Class Attendance

[http://www.qcc.mass.edu/PresidentsOffice/POLICIES/ADOBE%20POLICIES/version%20in%20adobe/Class%20Attendance%20Policy%20\(revision\).pdf](http://www.qcc.mass.edu/PresidentsOffice/POLICIES/ADOBE%20POLICIES/version%20in%20adobe/Class%20Attendance%20Policy%20(revision).pdf)

QUINSIGAMOND COMMUNITY COLLEGE

COURSE REVISION PROPOSAL

1. **Course Name & Number : Intermediate Writing ENG 096**

2. **Originator:** Betsy Zuegg **Date:** 9/7/10

3. **Division Dean:** Nicole Currier **Date:** 9/7/10

4. **Brief Description of the Proposal:**

The Dev. Eng. work area revised the evaluation procedures for final exit exams in ENG 095 and ENG 096 from a letter grade on the exam to a pass/fail grade. This, therefore, necessitates a change in the prerequisites for ENG 095, ENG 096 and ENG 100. We request to change ENG 096 to the following: *To continue to the next level of English courses, students must pass the departmental final examination (or appropriate placement on the placement exam).*

5. **Effective Date:** Fall 2010

6. **Division Recommendation:** This recommendation was voted and approved at the September 16, 2010 Humanities Division Meeting.

7. **Academic Affairs Staff:** _____ **Date:** _____

Recommended: _____ **Not Recommended:** _____

Comments:

8. **VP/Academic Affairs:** _____ **Date:** _____

Recommended: _____ **Not Recommended:** _____

Comments:

9. **Academic Affairs Committee:** _____ **Date:** _____

Recommended: _____ **Not Recommended:** _____

Comments:

10. **VP/Academic Affairs:** _____ **Date:** _____

Approved: _____ **Not Approved:** _____

Comments:

Quinsigamond Community College
Course Revision Proposal

Type of Revision: <input type="checkbox"/> Description <input checked="" type="checkbox"/> Prerequisite <input type="checkbox"/> Corequisite <input type="checkbox"/> Number <input type="checkbox"/> Title <input type="checkbox"/> #credits <input type="checkbox"/> <input type="checkbox"/> Elective Type <input type="checkbox"/> other (explain)	
Course Discipline or Department: Dev. English	Division: Humanities
Current Course Title: Intermediate Writing	
Current Course Number: ENG 096	
Current Course Description (as it appears in the college catalog): This course helps students develop writing competence by practicing writing paragraphs and essays. Students learn to write unified, supported, coherent essays using grammatically sound sentences. Assignments focus on writing a variety of paragraphs and essays in order to prepare for college-level writing courses. To continue to the next level of English courses, students must earn a grade "C" or higher on the departmental writing final examination (or appropriate placement on the placement exam).	
Proposed Description (include all proposed changes): This course helps students develop writing competence by practicing writing paragraphs and essays. Students learn to write unified, supported, coherent essays using grammatically sound sentences. Assignments focus on writing a variety of paragraphs and essays in order to prepare for college-level writing courses. To continue to the next level of English courses, students must pass the departmental final exit examination (or appropriate placement on the placement exam). Prerequisite: Passing the ENG 095 departmental writing final examination or appropriate placement score. This developmental English course cannot be used to satisfy degree or certificate requirements. F/S/ SU	
Rationale for the change: Revision of grading for final exit exams necessitates prerequisite change.	
For change in the number of credits, provide a description of the change in course content.	
Does the proposed change affect another department? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If yes, explain and please confer with the coordinator of the affected department.	
If this change affects a program grid, please submit a Program Revision Proposal.	

QUINSIGAMOND COMMUNITY COLLEGE

COURSE REVISION PROPOSAL

1. **Course Name & Number : Introduction to English Composition, ENG 100**

2. **Originator:** Betsy Zuegg **Date:** 9-7-10

3. **Division Dean:** Nicole Carrier **Date:** 9-7-10

4. **Brief Description of the Proposal:**

The Dev. Eng. work area revised the evaluation procedures for final exit exams in ENG 095 and ENG 096 from a letter grade on the exam to a pass/fail grade. This, therefore, necessitates a change in the prerequisite description for ENG 100.

5. **Effective Date:** Emergency approval in place as of June 18, 2010.

6. **Division Recommendation:** This recommendation was voted and approved at the September 16, 2010 Humanities Division Meeting.

7. **Academic Affairs Staff:** _____ **Date:** _____

Recommended: _____ **Not Recommended:** _____
Comments:

8. **VP/Academic Affairs:** _____ **Date:** _____

Recommended: _____ **Not Recommended:** _____
Comments:

9. **Academic Affairs Committee:** _____ **Date:** _____

Recommended: _____ **Not Recommended:** _____
Comments:

10. **VP/Academic Affairs:** _____ **Date:** _____

Approved: _____ **Not Approved:** _____
Comments:

QUINSIGAMOND COMMUNITY COLLEGE

NEW DEGREE PROGRAM OR NEW CERTIFICATE PROPOSAL

1. **Program Name:** Basic Engineering – Associate in Science – Biomedical Engineering Option

2. **Originator:** Dadbeh Bigonahy **Date:** 9.9.10

3. **Division Dean:** Kathy Rentsch **Date:** 9.9.10

4. **Brief Description of the Proposal:**

Create a new Option, Biomedical Engineering.

5. **Effective Date:** Spring 2011

6. **Division Recommendation:**

This recommendation was approved at the September 16, 2010 meeting of the Business & Technology Division.

7. **Academic Affairs Staff:** _____ **Date:** _____

Recommended: _____ **Not Recommended:** _____

Comments:

8. **VP/Academic Affairs:** _____ **Date:** _____

Recommended: _____ **Not Recommended:** _____

Comments:

9. **Academic Affairs Committee:** _____ **Date:** _____

Recommended: _____ **Not Recommended:** _____

Comments:

10. **VP/Academic Affairs:** _____ **Date:** _____

Approved: _____ **Not Approved:** _____

Comments:

FOR NEW PROGRAM/CERTIFICATE OR PROGRAM/CERTIFICATE CLOSURE ONLY

President: _____ **Date:** _____

Approved: _____ **Not Approved:** _____

Board of Trustees: _____ **Date:** _____

Approved: _____ **Not Approved:** _____

BASIC ENGINEERING - Associate in Science - Biomedical Engineering Option (Study Option: TBD)

Course Title	Course #	Offered	Plan to Take	Grade	Credits	Prerequisites
Semester 1						
General Biology: Core Concepts	BIO 101	F/S/SU			4	MAT 095 with a "C" or better on the MAT 095 departmental final exam or appropriate Placement score; Coreq- ENG 101
Principles of Chemistry I	CHM 103	F/S/SU			4	Coreq-MAT 123
English Composition & Literature I	ENG 101	F/S/SU			3	ENG 100 or approp place score
Calculus I	MAT 233	F/S/SU			4	MAT 124
Social Science Elective	---				3	
Semester 2						
Cell Biology	BIO 259	F/S			4	BIO 101
Principles of Chemistry II	CHM 104	F/S/SU			4	CHM 103
English Composition & Literature II	ENG 102	F/S/SU			3	ENG 101
Calculus II	MAT 234	F/S/SU			4	MAT 233
General Physics I	PHY 105	S/SU			4	MAT 233
Semester 3 (Summer)						
Probability & Statistics for Engineers & Scientists	MAT 237	F/SU			3	MAT 233
General Physics II	PHY 106	F/SU			4	MAT 234, PHY 105
Semester 4						
Molecular Biology	BIO 260	F/S			4	BIO 259
Introduction to Materials Science	ERG 211	F/SU			3	CHM 103, PHY 105
Statics	ERG 221	F/IN			3	MAT 234, PHY 105, PHY 106, Coreq-MAT 235
Calculus III	MAT 235	F			4	MAT 234
Semester 5						
Thermodynamics	ERG 223	S			3	CHM 104, MAT 235, PHY 106
Strength of Materials	ERG 225	S			3	ERG 221, MAT 235, Coreq-MAT 238
Differential Equations	MAT 238	S/SU			3	MAT 235
Linear Algebra	MAT 243	S/SU			3	Coreq-MAT 238
General Physics III	PHY 205	S/SU			4	MAT 235, PHY 106, Coreq-MAT 238
Total credits required					74	

The Degree:
Associate in Science

The Program:
Basic Engineering-Biomedical Engineering Option

Admission Requirements:

- High School Diploma or GED (refer to page 9)

The Next Step:

The Basic Engineering program prepares students to transfer to a four-year engineering program.

- This program has transfer articulation agreements
- More information on transfer is available on pages 20-21 or at www.qcc.mass.edu/transfer
Former joint admissions program

Program Coordinator:

Dadbeh Bigonahy 508.854.4323
dadbehb@qcc.mas.edu

Program Footnotes:

- Students should note that most required courses carry minimum prerequisites of ENG 100 and MAT124.
- WPI has notified QCC that they will not accept courses for transfer credit if the courses were taken on-line. Students are advised to consult with their transfer institution(s) of choice for information on similar policies.

Technical Performance Standards:

Review the Technical Performance Standards requirements on pages xxx.

QUINSIGAMOND COMMUNITY COLLEGE

DEGREE PROGRAM OR CERTIFICATE REVISION PROPOSAL

1. Program Name: Energy Utility Technology

2. Originator: Sharron Gillies

Date: August 23, 2010

3. Division Dean: Kathy Rentsch

Date: September 16, 2010

4. Brief Description of the Proposal:

EUT 101 Fundamentals of the Energy Industry was approved at the 4/13/2010 meeting of the Academic Affairs Committee. This course replaces EUT 100 Introduction to Energy Industry. At that time, appropriate changes were not made in the program grid for the Energy Utility Technology Certificate to reflect the replacement of EUT 100 with EUT 101 as a corequisite for EUT 110 Electrical Principles I and a prerequisite for EUT 120 Industrial Safety. This document corrects that oversight.

5. Effective Date: Immediate; July 26, 2010 EUT 100/EUT 101 memo emergency approval in place

6. Division Recommendation:

This proposal was approved at the September 16, 2010 meeting of the Business & Technology Division.

7. Academic Affairs Staff: _____ Date: _____

Recommended: _____ Not Recommended: _____

Comments:

8. VP/Academic Affairs: _____ Date: _____

Recommended: _____ Not Recommended: _____

Comments:

9. Academic Affairs Committee: _____ Date: _____

Recommended: _____ Not Recommended: _____

Comments:

10. VP/Academic Affairs: _____ Date: _____

Approved: _____ Not Approved: _____

Comments:

Quinsigamond Community College
Degree Program or Certificate Revision Proposal

Program: Energy Utility Technology
Division: Business & Technology
Degree type: Certificate
<p>Provide a detailed list of the proposed changes to the program.</p> <ol style="list-style-type: none"> 1. Amend the Energy Utility Technology Certificate grid to replace EUT 100 with EUT 101 as corequisite for EUT 110 2. Amend the Energy Utility Technology Certificate grid to replace EUT 100 with EUT 101 as a prerequisite for EUT 120
<p>Attachments:</p> <p>Current program grid Proposed program grid Course descriptions for any new courses or revised courses that are part of the program revision</p>
Submit separate proposals for any new courses or revised courses in the program.
<p>Provide a rationale for the proposed changes</p> <p>EUT 101 Fundamentals of the Energy Industry was approved at the 4/13/2010 meeting of the Academic Affairs Committee. This course replaces EUT 100 Introduction to Energy Industry. At that time, appropriate changes were not made in the program grids for the Energy Utility Technology Certificate to reflect the replacement of EUT 100 with EUT 101 as a corequisite for EUT 110 Electrical Principles I and a prerequisite for EUT 120 Industrial Safety. This document corrects that oversight.</p>
<p>Do any of the proposed changes affect another department? Examples include the deletion or addition of program courses that are offered by other departments. Please confer with the coordinators of affected departments.</p> <p>No</p>
<p>Do any of the proposed changes affect articulation agreements? Consult with the Transfer Coordinator.</p> <p>No</p>
<p>For an associate degree program, are there any changes in the number of general education credits that could affect MassTransfer?</p> <p>No</p> <p>If yes please provide a rationale.</p>
<p>Will any of the following be required: n/a Additional staff ____ Additional space ____ Additional equipment ____ Provide a rationale for any needs indicated and include approximate cost of equipment.</p>

Course Description

CURRENT

EUT 110 Electrical Principles I

4 credits

The course examines the foundations of basic DC circuit analysis concepts. Topics include voltage and current sources, Ohm's law, Kirchhoff's Laws, concept of resistance, conductance, capacitance, inductance, network topologies such as elements in series and parallel, Thevenin's and Norton's Theorems, and transient behavior of RC and RL circuits. Students utilize computer software tools and laboratory experiments to reinforce concepts.

Prerequisite: MAT 095 with a "C" or better on the MAT 095 departmental final exam or placement by the Computerized Placement Test.

Corequisites: ENG 100, EUT 100. F

Course Description

PROPOSED

EUT 110 Electrical Principles I

4 credits

The course examines the foundations of basic DC circuit analysis concepts. Topics include voltage and current sources, Ohm's law, Kirchhoff's Laws, concept of resistance, conductance, capacitance, inductance, network topologies such as elements in series and parallel, Thevenin's and Norton's Theorems, and transient behavior of RC and RL circuits. Students utilize computer software tools and laboratory experiments to reinforce concepts.

Prerequisite: MAT 095 with a "C" or better on the MAT 095 departmental final exam or placement by the Computerized Placement Test.

Corequisites: ENG 100 or appropriate Placement score, EUT 101. F

Course Description

CURRENT

EUT 120 Industrial Safety

3 credits

This course provides an introduction to the principles of safety, guidelines for the design of equipment, and explanations of why certain practices should or should not be followed. This course will evaluate human reactions in normal and abnormal conditions. Students compare features required for safe working conditions to industry standards.

Prerequisite: EUT 100. S

Course Description

PROPOSED

EUT 120 Industrial Safety

3 credits

This course provides an introduction to the principles of safety, guidelines for the design of equipment, and explanations of why certain practices should or should not be followed. This course evaluates human reactions in normal and abnormal conditions. Students compare features required for safe working conditions to industry standards.

Prerequisite: EUT 101. S

Energy Utility Technology – Certificate

CURRENT

Course Title	Course #	Offered	Plan to Take	Grade	Credits	Prerequisites
Semester 1						
Fundamentals of the Energy Industry	EUT 101	F			4	Coreq - ENG 100 or appropriate placement score MAT 095 or appropriate placement score MAT 095 or appropriate placement score Coreq - ENG 100, EUT 100
Introduction to Microcomputer Applications	CIS 111	F/S/SU			3	
Applied Technical Mathematics*	MAT 108	F/S			4	
Electrical Principles I	EUT 110	F			4	
Semester 2						
Electrical Principles II	EUT 111	S			4	EUT 110
Generation, Transmission & Distribution	EUT 115	S			4	EUT 110
Industrial Safety	EUT 120	S			3	EUT 100
Energy Utility Technology Practicum	EUT 190	S			3	Coreqs - EUT 111, 115,120
Total credits required					29	

Energy Utility Technology – Certificate

PROPOSED

Course Title	Course #	Offered	Plan to Take	Grade	Credits	Prerequisites
Semester 1						
Fundamentals of the Energy Industry	EUT 101	F			4	Coreq - ENG 100 or appropriate placement score MAT 095 or appropriate placement score MAT 095 or appropriate placement score Coreq - ENG 100 or appropriate Placement score, EUT 101
Introduction to Microcomputer Applications	CIS 111	F/S/SU			3	
Applied Technical Mathematics*	MAT 108	F/S			4	
Electrical Principles I	EUT 110	F			4	
Semester 2						
Electrical Principles II	EUT 111	S			4	EUT 110
Generation, Transmission & Distribution	EUT 115	S			4	EUT 110
Industrial Safety	EUT 120	S			3	EUT 101
Energy Utility Technology Practicum	EUT 190	S			3	Coreqs - EUT 111, 115,120
Total credits required					29	

**QUINSIGAMOND COMMUNITY COLLEGE
COURSE APPROVAL/REVISION
CURRICULUM APPROVAL/REVISION
PROGRAM REVISION
ACTION FORM**

1. **Course/Program Title:** HVC 101 Basic Refrigeration Systems and Heat Theory

2. **Originator:** Robert Recko for the Business & Technology Division **Date:** 9.9.10

3. **Academic Unit Dean:** Kathy Rentsch **Date:** 9.16.10

Recommendation: HVC 101 Basic Refrigeration Systems and Heat Theory

Rationale: This course will provide a broad range of theory required to understand not only refrigeration and other cooling systems, but heating systems as well. Development of this course as part of the HVAC Certificate was approved at the May 11, 2010 Academic Affairs Committee meeting.

This proposal was approved at the September 16, 2010 meeting of the Business & Technology Division.

4. **Recommended:** _____ **Not Recommended:** _____

Academic Affairs Staff: _____ **Date:** _____

Comments:

5. **Recommended:** _____ **Not Recommended:** _____

VP/Academic Affairs: _____ **Date:** _____

Comments:

6. **Recommended:** _____ **Not Recommended:** _____

Academic Affairs Committee _____ **Date:** _____

Comments:

7. **Approved:** _____ **Not Approved:** _____

VP/Academic Affairs: _____ **Date:** _____

Comments:

**Quinsigamond Community College
Request for a New Course or Course Revision**

Course Discipline Heating, Ventilation and Air Conditioning Division Business & Technology

Date 9.16.10

Course Title Basic Refrigeration Systems and Heat Theory

Course Number HVC 101

Lecture Hours 45 Credits 4 Clinic Hrs 0 Lab Hrs 45

Prerequisite none Corequisite none

Application As Elective? no

Course Effective Term Spring Year Academic year 2011

1) Does This Course Replace Another Course? _____ Yes ___ No X

Which Course? _____

If Revision, Rationale For Revision Should Be Given Here:

2) Is Course Content Similar To Other Courses Now Offered? ___ Yes ___ X No
If Yes, Attach Statement From Chairperson Of Department Offering Similar Course.

3) For Whom Is This Course Designed? Students in the HVAC Certificate Program

4) Required Course? X Yes ___ No Required For HVAC Certificate Program

5) Expected Enrollment Per Term 20 Per Year 20

6) Additional Staff? X Yes ___ No Number Of Additional Staff Part-time coordinator/faculty

7) Additional Space? ___ x Yes ___ No

Amount Of Additional Space Off-site laboratory location to be identified

8) Additional Equipment? ___ Yes ___ X No Additional Cost \$ _____

9) Additional LRC Materials? ___ x Yes ___ No Estimated Cost \$ 500.00

Signature: _____ (Library Services Director)

10) Text And Related Materials

The following textbooks are required.

Jerry Killinger and LaDonna Killinger.

Heating and Cooling Essentials

Goodheart-Wilcox

ISBN-978-1-56637-965-6

11) Attach Course Description And Outline To This Page

12) CIP Code

47.02

QUINSIGAMOND COMMUNITY COLLEGE

COURSE DESCRIPTION:

HVC 101 Basic Refrigeration Systems and Heat Theory

4 credits

This course introduces students to the basic concepts of heat transfer that dictate the behavior and operation of both heating and cooling systems. Topics lay the groundwork for the basic refrigeration cycle, including sensible, latent, and specific heat. Students apply temperature and pressure concepts to refrigeration system models. This course includes a laboratory component.

Prerequisites: none

Recommended:

A. Desired Student Outcomes/Instructional Objectives

Student Learning Outcomes/Competencies

Upon successful completion of this course, students are expected to demonstrate mastery in these areas:

1. Students demonstrate safe lab practices;
2. Students identify the significance of the HVAC/R industry in both the past, present and future;
3. Students identify the characteristics and application of copper tubing;
4. Students apply heat transfer principles to heat calculation problems;
5. Students apply knowledge of copper tubing to soldering operations;
6. Students apply heat transfer principles temperature and pressure to fluid problems;
7. Students use knowledge of temperature, pressure and heat transfer to identify and explain the operation of the basic refrigeration cycle;
8. Students apply knowledge of copper tubing to brazing operations;
9. Students apply knowledge of piping materials, tools to piping operations;
10. Students apply knowledge of Refrigerants to properly apply refrigerants to working systems;
11. Students apply knowledge of hands tools for safe and efficient operation;
12. Students solve computations involving HVAC/R material and practices;
13. Students apply knowledge of fasteners to make proper selections for appropriate fastening;

B. Course Academic Requirements and Teaching Approach

1. Students are expected to attend every class. Students who must miss a class are responsible for any assignments due for that class, and must contact the instructor in person or by e-mail to get the assignments due for the next class. Students may obtain assignments ahead of time for unavoidable, excusable absences. Missed exams or quizzes due to a justified absence must be made up as soon as possible, typically within the day of the student's return to class.
2. Assigned readings and/or exercises for a class are required and must have been completed by the assigned deadline.
3. Students are expected to participate in class exercises and discussion.
4. Students are required to take all quizzes and exams and a final exam, as scheduled.
5. Students are expected to complete all assigned lab projects by their specified deadlines. A brief extension may be granted only in case the submitted work, albeit incomplete, shows sufficient progress and promise of completion.

Teaching approach

The class will be conducted as a combination of classroom lecture, hands-on lab projects, and collaborative interactions.

Theoretical presentations will be followed by practical hands-on lab exercises, under the instructor's supervision.

C. Required Textbooks:

The following textbooks are required:

Jerry Killinger and LaDonna Killinger. Heating and Cooling Essentials.

Goodheart-Wilcox. ISBN-978-1-56637-965-6

D. Course Outline

Week One

Introduction to the course: syllabus,

Introduction to Heating, Ventilation, Air Conditioning and Refrigeration (HVAC/R)

HVAC/R Safety

Copper Tubing

Reading Assignments:

Class notes

Killinger-Heating and Cooling Essentials. Chapter Three. Working with Copper Tubing Sections 3.1-3.3

Quiz

Weeks Two, Three

Basic Thermodynamic Principles

Reading Assignments:

Class notes

Killinger-Heating and Cooling Essentials. Chapter Eight. Sections 8.1-8.7

Quiz

Week Four

Soldering Coppering Tubing

Reading Assignments:

Class notes

Killinger-Heating and Cooling Essentials. Soldering. Sections 5.1-5.6

Quiz

Week Five

Temperature and Pressure

Measuring Temperature and Pressure

Gas Laws

Reading Assignments:

Class notes

Killinger. Heating and Cooling Essentials. Temperature and Pressure. Sections 9.1-9.8

Quiz

Weeks Six, Seven

Basic Refrigeration Cycle
System Operation
System Components

Reading Assignments:

Class notes
Killinger. Heating and Cooling Essentials. Basic Refrigeration Cycle. Sections 10.1-10-3

Quiz

Week Eight

Brazing Copper Tubing

Reading Assignments:

Killinger. Heating and Cooling Essentials. Brazing. Sections 6.1-6.5

EXAM #1

Week Nine

Refrigeration Cycle Accessories

Reading Assignments:

Class notes
Killinger-Heating and Cooling Essentials. Other System Components. Sections 11.1-11-8

Quiz

Week Ten

Pipe Operations, Materials, and Applications

Reading Assignments:

Class notes
Killinger-Heating and Cooling Essentials. Working with Pipe. Sections 4.1-4.4

Quiz

Weeks Eleven, Twelve

Refrigerants
History of Refrigerants/Refrigeration

Reading Assignments:

Class notes
Killinger. Heating and Cooling Essentials. Refrigerants. Sections 12.1-12.10

Quiz

Week Thirteen

Hand Tools Operation and Safety

Reading Assignments:

Class notes
Killinger. Heating and Cooling Essentials. Hand Tools. Sections 1.1-1.9

Quiz

Week Fourteen

Math for HVAC/R Technicians

Reading Assignments:

Class notes

Killinger. Heating and Cooling Essentials. Mathematics for Technicians. Sections 7.1-7.9

Quiz-Applied Mathematical Problems for HVAC/R

Week Fifteen

Fasteners for HVAC/R Applications

Reading Assignments:

Class notes

Killinger-Heating and Cooling Essentials. Fasteners. Sections 2.1-2.9

Quiz

Exam #2

FINAL EXAM AS SCHEDULED!

D. Method of Evaluation

Final grades for this course will be based on the following:

Exam 1:	10%
Exam 2:	10%
Final Exam:	30%
Eleven Quizzes:	20% (all worth the same)
Lab Projects:	30% (all worth the same)

Lab Project Criteria

- All lab projects must meet current industry standards for workmanship and safety
- All lab projects will be further judged on by specific rubrics given for each project

Plagiarism

- Submitted assignments are expected to be the product of the student's individual and original effort.

Final course grade will follow the QCC grading system as published on page 41 of the 2010/2011 College catalog.

Assessment Plan

WEEK	TOPIC	LEARNING OUTCOME	INSTRUCTIONAL METHODOLOGY	FACULTY RESOURCES	STUDENT RESOURCES	PRE ASSESSMENT	POST ASSESSMENT
Week 1	Introduction to Heating, Ventilation, Air Conditioning and Refrigeration (HVAC/R) HVAC/R Safety Copper Tubing	1. Students demonstrate safe Lab practices 2. Students identify the significance of the HVAC/R industry in both the past, present and future. 3. Students identify the characteristics and application of copper tubing	Lecture Group work Lab Work: Copper Tubing Operations	Course textbooks Class Handouts	Course textbooks	Class Q/A	Quiz Exam # 1 Final exam
Week 2	Basic Thermodynamic Principles	Students apply heat transfer principles to heat calculation problems	Lecture Group work Lab Work: Copper Tubing Operations	Course textbooks Class Handouts	Course textbooks	Class Q/A	Quiz Exam # 1 Final exam
Week 3	Basic Thermodynamic Principles (Cont.)	Students apply heat transfer principles to heat calculation problems	Lecture Group work Lab Work: Copper Tubing Operations	Course textbooks Class handouts	Course textbooks Class handouts	Class Q/A	Quiz Exam #1 Final Exam
Week 4	Soldering Coppering Tubing	Students apply knowledge of copper tubing to soldering operations	Lecture Group work Lab Work: Soldering Copper Tubing Operations	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam

Week Five	Temperature and Pressure Measuring Temperature and Pressure Gas Laws	Students apply heat transfer principles temperature and pressure to fluid problems	Lecture Group work Lab Work: Soldering Copper Tubing Operations	Course textbooks Class handouts	Course textbooks Web links	Class Q/A	Quiz Exam #1 Final Exam
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Week Six	Basic Refrigeration Cycle System Operation System Components	Students use knowledge of temperature, pressure and heat transfer to identify and explain the operation of the basic refrigeration cycle	Lecture Group work Lab Work: Soldering Copper Tubing Operations	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
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Weeks Seven	Basic Refrigeration Cycle System Operation System Components (Cont.)	Students use knowledge of temperature, pressure and heat transfer to identify and explain the operation of the basic refrigeration cycle .	Lecture Group work Lab Work: Soldering Copper Tubing Operations	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
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Week Eight	Brazing Copper Tubing	Students apply knowledge of copper tubing to Brazing operations	Lecture Group work Lab Work: Brazing Copper Tubing Operations	Course Textbooks Class handouts	Course Textbooks	Class Q/A	Quiz Exam #1 Final Exam
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Week Nine	Refrigeration Cycle Accessories	Students identify cycle components for proper application and operation	Lecture Group work Lab Work: Brazing Copper Tubing Operations	Course Textbooks Class handouts	Course Textbooks	Class Q/A	Quiz Exam #2 Final Exam

Week Ten	Pipe Operations, Materials, and Applications	Students apply knowledge of piping materials, tools to piping operations	Lecture Group work Lab work: Plastic and Steel Piping Operations	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Eleven	Refrigerants History of Refrigerants/Refri geration	Students apply knowledge of Refrigerants to properly apply refrigerants to working systems	Lecture Group work Lab work: Building complete Refrigeration Systems	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Twelve	Refrigerants History of Refrigerants/Refri geration (Cont.)	Students apply knowledge of Refrigerants to properly apply refrigerants to working systems	Lecture Group work Lab work: Building complete Refrigeration Systems	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Thirteen	Hand Tools Operation and Safety	Students apply knowledge of hands tools for safe and efficient operation	Lecture Group work Lab work: Building complete Refrigeration Systems	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Fourteen	Math for HVAC/R Technicians	Students solve computations involving HVAC/R material and practices	Lecture Group work Lab work: Evacuating and charging of refrigeration systems	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Fifteen	Fasteners for HVAC/R Applications	Students apply knowledge of fasteners to make proper selections for appropriate fastening applications	Lecture Group work Lab work: Refrigerant Recovery	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam

**QUINSIGAMOND COMMUNITY COLLEGE
COURSE APPROVAL/REVISION
CURRICULUM APPROVAL/REVISION
PROGRAM REVISION
ACTION FORM**

- 1. **Course/Program Title:** HVC 102 Basic Electricity
- 2. **Originator:** Robert Recko for the Business & Technology Division **Date:** 9.9.10
- 3. **Academic Unit Dean:** Kathy Rentsch **Date:** 9.16.10

Recommendation: HVC 102 Basic Electricity

Rationale: This course will provide a broad range of electrical theory that will provide the skills needed to install, diagnose and repair HVAC/R systems. Development of this course as part of the HVAC Certificate was approved at the May 11, 2010 Academic Affairs Committee meeting.

This proposal was approved at the September 16, 2010 meeting of the Business & Technology Division.

4. **Recommended:** _____ **Not Recommended:** _____

Academic Affairs Staff: _____ **Date:** _____

Comments:

5. **Recommended:** _____ **Not Recommended:** _____

VP/Academic Affairs: _____ **Date:** _____

Comments:

6. **Recommended:** _____ **Not Recommended:** _____

Academic Affairs Committee _____ **Date:** _____

Comments:

7. **Approved:** _____ **Not Approved:** _____

VP/Academic Affairs: _____ **Date:** _____

Comments:

**Quinsigamond Community College
Request for a New Course or Course Revision**

Course Discipline Heating, Ventilation and Air Conditioning Division Business & Technology

Date 9.16.10

Course Title Basic Electricity Course Number HVC 102

Lecture Hours 45 Credits 4 Clinic Hrs 0 Lab Hrs 45

Prerequisite HVC 101 Corequisite none

Application As Elective? no

Course Effective Term Spring Year Academic year 2011

1) Does This Course Replace Another Course? _____ Yes _____ No X

Which Course? _____

If Revision, Rationale For Revision Should Be Given Here:

2) Is Course Content Similar To Other Courses Now Offered? _____ Yes _____ X No
If Yes, Attach Statement From Chairperson Of Department Offering Similar Course.

3) For Whom Is This Course Designed? Students in the HVAC Certificate Program

4) Required Course? X Yes _____ No Required For HVAC Certificate Program

5) Expected Enrollment Per Term 20 Per Year 20

6) Additional Staff? X Yes _____ No Number Of Additional Staff Part-time coordinator/faculty

7) Additional Space? _____ x Yes _____ No

Amount Of Additional Space Off-site laboratory location to be identified

8) Additional Equipment? _____ Yes _____ X No Additional Cost \$ _____

9) Additional LRC Materials? _____ x Yes _____ No Estimated Cost \$ 500.00

Signature: _____ (Library Services Director)

10) Text And Related Materials

The following textbooks are required.

Jerry Killinger and LaDonna Killinger.

Heating and Cooling Essentials

Goodheart-Wilcox

ISBN-978-1-56637-965-6

11) Attach Course Description And Outline To This Page

12) CIP Code

47.02

QUINSIGAMOND COMMUNITY COLLEGE

COURSE DESCRIPTION:

HVC 102 Basic Electricity

4 credits

This course covers AC fundamentals, Ohm's Law, and other circuit rules effecting circuit behavior, as well as basic electrical components used to develop series and parallel control circuits. Laboratory exercises focus on creating wiring diagrams, and their application to actual wiring practices on working circuitry. Students are trained in the use of electrical meters to develop troubleshooting procedures. This course incorporates electrical Safety into all activities. This course includes a laboratory component.

Prerequisite: HVC 101

Recommended:

A. Desired Student Outcomes/Instructional Objectives

Student Learning Outcomes/Competencies

Upon successful completion of this course, students are expected to demonstrate mastery in these areas:

1. Students demonstrate safe lab practices;
2. Students apply knowledge of electron theory to explain basic electrical operation;
3. Students apply basic circuit rules to construct electrical schematics;
4. Students apply principles of series and parallel circuits to identify correct and safe circuit operation;
5. Students demonstrate the differences between Alternating and Direct Current;
6. Students identify and apply electrical switch symbols;
7. Students use knowledge of induction to identify and explain the operation of transformers;
8. Students apply knowledge of low voltage components used in HVAC circuits;
9. Students apply knowledge of electro-magnetic devices used as relay switching devices in HVAC/R circuits;
10. Students apply knowledge of electro-magnetic devices used as contactor and motor starter switching and protective devices in HVAC/R circuits;
11. Students apply knowledge of circuit protection devices in working HVAC/R circuits;
12. Students demonstrate knowledge of AC induction motors operation and application;
13. Students apply knowledge motor starting relays for correct application on induction motors
14. Students apply knowledge motor starting relays, motors and controls to identify common motor control circuits used in HVAC/R systems;

B. Course Academic Requirements and Teaching Approach

1. Students are expected to attend every class. Students who must miss a class are responsible for any assignments due for that class, and must contact the instructor in person or by e-mail to get the assignments due for the next class. Students may obtain assignments ahead of time for unavoidable, excusable absences Missed exams or quizzes due to a justified absence must be made up as soon as possible, typically within the day of the student's return to class.
2. Assigned readings and/or exercises for a class are required and must have been completed by the assigned deadline
3. Students are expected to participate in class exercises and discussion.
4. Students are required to take all quizzes and exams and a final exam, as scheduled.
5. Students are expected to complete all assigned lab projects by their specified deadlines. A brief extension may be granted only in case the submitted work, albeit incomplete, shows sufficient progress and promise of completion.

Teaching approach

The class will be conducted as a combination of classroom lecture, hands-on lab projects, and collaborative interactions.

Theoretical presentations will be followed by practical hands-on lab exercises, under the instructor's supervision.

C. Required Textbooks:

The following textbooks are required:

Jerry Killinger and LaDonna Killinger. Heating and Cooling Essentials.
Goodheart-Wilcox. ISBN-978-1-56637-965-6

D. Course Outline

Week One

Introduction to the course: syllabus,
Understanding Electricity
HVAC/R Safety

Reading Assignments:

Class notes
Killinger-Heating and Cooling Essentials. Chapter 22. What Is Electricity Sections 22.1.1 – 22.1.4

Quiz

Week Two

Basic Circuit Rules
Ohms, Volts, Amps, and Watts

Reading Assignments:

Class notes
Killinger-Heating and Cooling Essentials. Chapter 22. What Is Electricity Sections 22.1.5 – 22.4.2

Quiz

Week Three

Series and Parallel Circuits

Reading Assignments:

Class notes
Killinger-Heating and Cooling Essentials. Chapter 22. What Is Electricity. Sections 22.4.5 – 22.4.6

Quiz

Weeks Four, Five

Alternating Current
Direct Current
Ohm's Law

Reading Assignments:

Class notes
Killinger-Heating and Cooling Essentials. Chapter 22. What Is Electricity. Sections 22.4.6 – 22.4.7

Quiz

Week Six

Switches

Reading Assignments:

Class notes

Killinger. Heating and Cooling Essentials. What is Electricity? Sections 22.4.6 & 22.6.2 & 26.1 – 26.4

Quiz

Week Seven

Transformers

Induction

Reading Assignments:

Killinger. Heating and Cooling Essentials. Power Transmissions and Circuits. Sections 23.2.1 – 23.2.3

Quiz

EXAM #1

Week Eight

Low Voltage Circuits and Controls

Reading Assignments:

Class notes

Killinger-Heating and Cooling Essentials. Chapter 29. Sections 29.1.6 – 29.1.9

Quiz

Week Nine

Relays

Reading Assignments:

Class notes

Killinger-Heating and Cooling Essentials. Electromagnetic Devices. Sections 25.1 & 25.2.1 – 25.2.2

Quiz

Week Ten

Contactors and Motor Starters

Reading Assignments:

Class notes

Killinger. Heating and Cooling Essentials. Electromagnetic Devices. Sections 25.2.3 – 25.3.2

Quiz

Week Eleven

Circuit Protection

Reading Assignments:

Class notes

Killinger. Heating and Cooling Essentials. What is Electricity. Sections 22.6 – 22.6.2 & 23.4

Quiz

Weeks Twelve, Thirteen

AC Induction Motors

Reading Assignments:

Class notes

Killinger. Heating and Cooling Essentials. Induction Motors. Sections 24.1 – 24.10.2

Quiz

Week Fourteen

Motor Starting Relays

Reading Assignments:

Reading Assignments:

Class notes

Killinger-Heating and Cooling Essentials. Electromagnetic Control Devices. Sections 25.2.2

Quiz

Week Fifteen

Control Circuits

Class notes

Killinger-Heating and Cooling Essentials. Electromagnetic Control Devices. Sections 25.2.3 – 25.3.2

Quiz

Exam #2

FINAL EXAM AS SCHEDULED!

D. Method of Evaluation

Final grades for this course will be based on the following:

Exam 1:	10%
Exam 2:	10%
Final Exam:	30%
Thirteen Quizzes:	20% (all worth the same)
Lab Projects:	30% (all worth the same)

Lab Project Criteria

- All lab projects must meet current industry standards for workmanship and safety
- All lab projects will be further judged on by specific rubrics given for each project

Plagiarism

- Submitted assignments are expected to be the product of the student's individual and original effort.

Final course grade will follow the QCC grading system as published on page 41 of the 2010/2011 College catalog.

Assessment Plan

WEEK	TOPIC	LEARNING OUTCOME	INSTRUCTIONAL METHODOLOGY	FACULTY RESOURCES	STUDENT RESOURCES	PRE ASSESSMENT	POST ASSESSMENT
Week 1	Introduction to the course: syllabus, Understanding Electricity HVAC/R Safety	1. Students demonstrate safe lab practices; 2. Students apply knowledge of electron theory to explain basic electrical operation;	Lecture Group work Lab Work: Identifying Electrical Components	Course textbooks Class Handouts	Course textbooks	Class Q/A	Quiz Exam # 1 Final exam
Week 2	Basic Circuit Rules Ohms, Volts, Amps, and Watts	Students apply basic circuits rules to construct electrical schematics	Lecture Group work Lab Work: Constructing Electrical Schematic	Course textbooks Class Handouts	Course textbooks	Class Q/A	Quiz Exam # 1 Final exam
Week 3	Series and Parallel Circuits	Students apply principles of series and parallel circuits to identify correct and safe circuit operation	Lecture Group work Lab Work: Wiring Electrical Schematics	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
Week 4	Alternating Current Direct Current Ohm's Law	Students demonstrate the differences between Alternating and Direct Current	Lecture Group work Lab Work: Measuring AC & DC Voltage	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
Week Five	Alternating Current Direct Current Ohm's Law (Cont.)	Students demonstrate the differences between AC & DC problems	Lecture Group work Lab Work: Using Electrical Meters	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1

Week Six	Switches	Students identify and apply electrical switch symbols	Lecture Group work Lab Work: Testing and Wiring Switches	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
Weeks Seven	Transformers Induction	Students use knowledge of induction to identify and explain the operation of transformers	Lecture Group work Lab Work: Testing and Wiring Transformers	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
Week Eight	Low Voltage Circuits and Controls	Students apply knowledge of low voltage components used in HVAC circuits	Lecture Group work Lab Work: Wiring Low Voltage Circuits	Course Textbooks Class handouts	Course Textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Nine	Relays	Students apply knowledge of electro-magnetic devices used as relay switching devices in HVAC/R circuits	Lecture Group work Lab Work: Wiring Relay Circuits	Course Textbooks Class handouts	Course Textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Ten	Contactors and Motor Starters	Students apply knowledge of electro-magnetic devices used as contactor and motor starter switching and protective devices in HVAC/R circuits	Lecture Group work Lab Work: Wiring Motor Starters and Contactors	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam

Week Eleven	Circuit Protection	Students apply knowledge of circuit protection devices in working HVAC/R circuits;	Lecture Group work Lab Work: Testing Circuit Protection Devices	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Twelve	AC Induction Motors	Students demonstrate knowledge of AC induction motors operation and application	Lecture Group work Lab Work: Wiring 1 Ø Motors	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam

Week Thirteen	AC Induction Motors (Cont.)	Students demonstrate knowledge of AC induction motors operation and application	Lecture Group work Lab Work: Wiring 3 Ø Motors	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Fourteen	Motor Starting Relays	Students apply knowledge motor starting relays for correct application on induction motors	Lecture Group work Wiring Motor Starting Relays	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Fifteen	Control Circuits	Students apply knowledge motor starting relays, motors and controls to identify common motor control circuits used in HVAC/R systems	Lecture Group work Wiring complete controls circuits	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam

**QUINSIGAMOND COMMUNITY COLLEGE
COURSE APPROVAL/REVISION
CURRICULUM APPROVAL/REVISION
PROGRAM REVISION
ACTION FORM**

- 1. **Course/Program Title:** HVC 103 Air Conditioning Systems
- 2. **Originator:** Robert Recko for the Business & Technology Division **Date:** 9.9.10
- 3. **Academic Unit Dean:** Kathy Rentsch **Date:** 9.16.10
- 4. **Recommendation:** HVC 103 Air Conditioning Systems

Rationale: This course will provide a broad range of information on HVAC/R systems that will provide the skills needed to install, diagnose and repair HVAC/R systems. Development of this course as part of the HVAC Certificate was approved at the May 11, 2010 Academic Affairs Committee meeting.

This proposal was approved at the September 16, 2010 meeting of the Business & Technology Division.

4. **Recommended:** _____ **Not Recommended:** _____

Academic Affairs Staff: _____ **Date:** _____

Comments:

5. **Recommended:** _____ **Not Recommended:** _____

VP/Academic Affairs: _____ **Date:** _____

Comments:

6. **Recommended:** _____ **Not Recommended:** _____

Academic Affairs Committee _____ **Date:** _____

Comments:

7. **Approved:** _____ **Not Approved:** _____

VP/Academic Affairs: _____ **Date:** _____

Comments:

**Quinsigamond Community College
Request for a New Course or Course Revision**

Course Discipline Heating, Ventilation and Air Conditioning Division Business & Technology

Date 9.16.10

Course Title Air Conditioning Systems Course Number HVC 103

Lecture Hours 45 Credits 5 Clinic Hrs 0 Lab Hrs 90

Prerequisite HVC 102 Corequisite none

Application As Elective? no

Course Effective Term Spring Year Academic year 2011

1) Does This Course Replace Another Course? _____ Yes _____ No X

Which Course? _____

If Revision, Rationale For Revision Should Be Given Here:

2) Is Course Content Similar To Other Courses Now Offered? _____ Yes _____ X No
If Yes, Attach Statement From Chairperson Of Department Offering Similar Course.

3) For Whom Is This Course Designed? Students in the HVAC Certificate Program

4) Required Course? X Yes _____ No Required For HVAC Certificate Program

5) Expected Enrollment Per Term 20 Per Year 20

6) Additional Staff? X Yes _____ No Number Of Additional Staff Part-time coordinator/faculty

7) Additional Space? _____ x Yes _____ No

Amount Of Additional Space Off-site laboratory location to be identified

8) Additional Equipment? _____ Yes _____ X No Additional Cost \$ _____

9) Additional LRC Materials? _____ x Yes _____ No Estimated Cost \$ 500.00

Signature: _____ (Library Services Director)

10) Text And Related Materials

The following textbooks are required.

Whitman/Johnson. Refrigeration & Air Conditioning Technology.

Delmar. ISBN-13: 978-1-4283-1936-3

ISBN-10: 1-4283-1936-0

11) Attach Course Description And Outline To This Page

12) CIP Code

47.02

QUINSIGAMOND COMMUNITY COLLEGE

COURSE DESCRIPTION:

HVC 103 Air Conditioning Systems

5 credits

This course is a study of mechanical air conditioning equipment used in comfort cooling, heat pump, and other heating applications. Hands-on laboratories cover the installation and use of electrical controls, system evaluation, and mechanical and electrical troubleshooting of residential and light-commercial applications. This course includes a laboratory component.

Prerequisite: HVC 102

Recommended:

A. Desired Student Outcomes/Instructional Objectives

Student Learning Outcomes/Competencies

Upon successful completion of this course, students are expected to demonstrate mastery in these areas:

1. Students demonstrate safe lab practices;
2. Students apply knowledge of refrigeration mechanisms to air conditioning applications;
3. Students apply industry standards in selecting and constructing materials used in air conditioning installations;
4. Students demonstrate the knowledge of control circuit design;
5. Students identify normal system temperatures and pressures for diagnosis of system problems;
6. Students apply knowledge of refrigeration mechanisms to air to air heat pump applications;
7. Students identify normal system temperatures and pressures for diagnosis of heat pump problems;
8. Students apply knowledge of fuel gas properties and mechanisms for application to gas heating appliances;
9. Students apply knowledge of fuel gas properties and mechanisms for application to the diagnosis of problems in gas heating appliances;
10. Students apply knowledge of fuel oil properties and mechanisms for application to oil heating appliances;
11. Students demonstrate knowledge of MA Oil Code Regulations;
12. Students apply knowledge of hydronic heating components and methods to heating systems installations;
13. Students apply knowledge of hydronic heating systems to diagnose heating systems problems;

B. Course Academic Requirements and Teaching Approach

1. Students are expected to attend every class. Students who must miss a class are responsible for any assignments due for that class, and must contact the instructor in person or by e-mail to get the assignments due for the next class. Students may obtain assignments ahead of time for unavoidable, excusable absences. Missed exams or quizzes due to a justified absence must be made up as soon as possible, typically within the day of the student's return to class.
2. Assigned readings and/or exercises for a class are required and must have been completed by the assigned deadline.
3. Students are expected to participate in class exercises and discussion.
4. Students are required to take all quizzes and exams and a final exam, as scheduled.
5. Students are expected to complete all assigned lab projects by their specified deadlines. A brief extension may be granted only in case the submitted work, albeit incomplete, shows sufficient progress and promise of completion.

Teaching approach

The class will be conducted as a combination of classroom lecture, hands-on lab projects, and collaborative interactions.

Theoretical presentations will be followed by practical hands-on lab exercises, under the instructor's supervision.

C. Required Textbooks:

The following textbooks are required:

Whitman/Johnson. Refrigeration & Air Conditioning Technology.

Delmar. ISBN-13: 978-1-4283-1936-3

ISBN-10: 1-4283-1936-0

D. Course Outline

Weeks One, Two

Introduction to the course: syllabus,
Refrigeration Mechanisms Applied to Air Conditioning
HVAC/R Safety

Reading Assignments:

Class notes

Whitman/Johnson. Refrigeration & Air Conditioning Technology.

Unit 36 Refrigeration Applied to Air Conditioning. 36.1 – 36.25

Quiz

Weeks Three, Four

Installation of Air Conditioning Systems

Reading Assignments:

Class notes

Whitman/Johnson. Refrigeration & Air Conditioning Technology.

Unit 38 Installation. 38.1 – 38.12

Quiz

Week Five

Air Conditioning Electrical Controls

Reading Assignments:

Class notes

Whitman/Johnson. Refrigeration & Air Conditioning Technology.

Unit 39 Controls. 39.1 – 39.11

Quiz

Weeks Six, Seven

Normal Operating Conditions of Air Conditioning Systems

Reading Assignments:

Class notes

Whitman/Johnson. Refrigeration & Air Conditioning Technology.

Unit 40 Operating Conditions. 40.1 – 40.18

Quiz

Weeks Eight, Nine

Air to Air Heat Pumps

Reading Assignments:

Class notes

Whitman/Johnson. Refrigeration & Air Conditioning Technology.

Unit Heat 43 Pumps. 43.1 – 43.35

Quiz

Exam # 1

Weeks Ten, Eleven

Gas Heating Systems

Reading Assignments:

Whitman/Johnson. Refrigeration & Air Conditioning Technology.

Unit 31 Gas Heat. 31. 1 – 31.31

Quiz

Weeks Twelve, Thirteen

Oil Heat Systems

Reading Assignments:

Class notes

Whitman/Johnson. Refrigeration & Air Conditioning Technology.

Unit 32 Oil Heat. 32.1 – 32.18

Quiz

Weeks Fourteen, Fifteen

Hydronic Heating Systems

Reading Assignments:

Class notes

Whitman/Johnson. Refrigeration & Air Conditioning Technology.

Unit 33 Hydronic Heat. 33.1 – 33.9

Quiz

Exam #2

FINAL EXAM AS SCHEDULED!

D. Method of Evaluation

Final grades for this course will be based on the following:

Exam 1:	10%
Exam 2:	10%
Final Exam:	30%
Eight Quizzes:	20% (all worth the same)
Lab Projects:	30% (all worth the same)

Lab Project Criteria

- All lab projects must meet current industry standards for workmanship and safety
- All lab projects will be further judged on by specific rubrics given for each project

Plagiarism

- Submitted assignments are expected to be the product of the student's individual and original effort.

Final course grade will follow the QCC grading system as published on page 41 of the 2010/2011 College catalog.

Assessment Plan

WEEK	TOPIC	LEARNING OUTCOME	INSTRUCTIONAL METHODOLOGY	FACULTY RESOURCES	STUDENT RESOURCES	PRE ASSESSMENT	POST ASSESSMENT
Week 1	Introduction to the course: syllabus, Refrigeration Mechanisms Applied to Air Conditioning HVAC/R Safety	1. Students demonstrate safe lab practices; 2. Students apply knowledge of refrigeration mechanisms to air conditioning applications	Lecture Group work Lab Work: Installation of Air Conditioning Systems	Course textbooks Class Handouts	Course textbooks	Class Q/A	Quiz Exam # 1 Final exam
Week 2	Refrigeration Mechanisms Applied to Air Conditioning HVAC/R Safety (Cont.)	Students apply knowledge of refrigeration mechanisms to air conditioning applications	Lecture Group work Lab Work: Installation of Air Conditioning Systems	Course textbooks Class Handouts	Course textbooks	Class Q/A	Quiz Exam # 1 Final exam
Week 3	Installation of Air Conditioning Systems	Students apply industry standards in selecting and constructing materials used in air conditioning installations	Lecture Group work Lab Work: Ducting and Piping Practices for Air Conditioning Systems	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
Week 4	Installation of Air Conditioning Systems (Cont.)	Students apply industry standards in selecting and constructing materials used in air conditioning installations	Lecture Group work Lab Work: Ducting and Piping Practices for Air Conditioning Systems	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
Week Five	Air Conditioning Electrical Controls	Students demonstrate the knowledge of control circuit design	Lecture Group work Lab Work: Using Electrical Meters	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1

Week Six	Normal Operating Conditions of Air Conditioning Systems	Students identify normal system temperatures and pressures for diagnosis of system problems	Lecture Group work Lab Work: Diagnosis of air conditioning problems	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
Weeks Seven	Normal Operating Conditions of Air Conditioning Systems (Cont.)	Students identify normal system temperatures and pressures for diagnosis of system problems	Lecture Group work Lab Work: Diagnosis of air conditioning problems	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
Week Eight	Air to Air Heat Pumps	Students apply knowledge of refrigeration mechanisms to air to air heat pump applications	Lecture Group work Lab Work: Piping Practices for air to air heat pumps	Course Textbooks Class handouts	Course Textbooks	Class Q/A	Quiz Exam #1 Final Exam
Week Nine	Air to Air Heat Pumps (Cont.)	Students identify normal system temperatures and pressures for diagnosis of heat pump problems	Lecture Group work Lab Work: Diagnosing air to air heat pump problems	Course Textbooks Class handouts	Course Textbooks	Class Q/A	Quiz Exam #1 Final Exam
Week Ten	Gas Heating Systems	Students apply knowledge of fuel gas properties and mechanisms for application to gas heating appliances	Lecture Group work Lab Work: Installation of gas heating appliances	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week	Gas Heating	Students apply	Lecture	Course	Course textbooks	Class Q/A	Quiz

Eleven	Systems (Cont.)	knowledge of fuel gas properties and mechanisms for application to the diagnosis of problems in gas heating appliances	Group work Lab work: Diagnosis of problems in gas heating appliances	textbooks Class handouts			Exam #2 Final Exam
Week Twelve	Oil Heat Systems	Students apply knowledge of fuel oil properties and mechanisms for application to oil heating appliances	Lecture Group work Lab work: Assembling oil burner mechanisms	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam

Week Thirteen	Oil Heat Systems (Cont.)	Students demonstrate knowledge of MA Oil Code Regulations	Lecture Group work Lab work: Installing oil heating systems to MA Code	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Fourteen	Hydronic Heating Systems	Students apply knowledge of hydronic heating components and methods to heating systems installations	Lecture Group work Lab work: Installation of hydronic heating systems	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Fifteen	Hydronic Heating Systems (Cont.)	Students apply knowledge of hydronic heating systems to diagnose heating systems problems	Lecture Group work Lab work: Hydronic heating systems diagnosis	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam

**QUINSIGAMOND COMMUNITY COLLEGE
COURSE APPROVAL/REVISION
CURRICULUM APPROVAL/REVISION
PROGRAM REVISION
ACTION FORM**

- 1. **Course/Program Title:** HVC 104 Massachusetts Refrigeration Code
- 2. **Originator:** Robert Recko for the Business & Technology Division **Date:** 9.9.10
- 3. **Academic Unit Dean:** Kathy Rentsch **Date:** 9.16.10
- 4. **Recommendation:** HVC 104 Massachusetts Refrigeration Code

Rationale: This course will provide the knowledge of the Massachusetts Refrigeration Code (ASHRAE 15) which is required to be applied to the installation of all refrigeration systems to ensure safety. Development of this course as part of the HVAC Certificate was approved at the May 11, 2010 Academic Affairs Committee meeting.

This proposal was approved at the September 16, 2010 meeting of the Business & Technology Division.

4. **Recommended:** _____ **Not Recommended:** _____

Academic Affairs Staff: _____ **Date:** _____

Comments:

5. **Recommended:** _____ **Not Recommended:** _____

VP/Academic Affairs: _____ **Date:** _____

Comments:

6. **Recommended:** _____ **Not Recommended:** _____

Academic Affairs Committee _____ **Date:** _____

Comments:

7. **Approved:** _____ **Not Approved:** _____

VP/Academic Affairs: _____ **Date:** _____

Comments:

**Quinsigamond Community College
Request for a New Course or Course Revision**

Course Discipline Heating, Ventilation and Air Conditioning Division Business & Technology

Date 9.16.10

Course Title Massachusetts Refrigeration Code Course Number HVC 104

Lecture Hours 45 Credits 4 Clinic Hrs 0 Lab Hrs 45

Prerequisite HVC 103 Corequisite none

Application As Elective? no

Course Effective Term Spring Year Academic year 2011

1) Does This Course Replace Another Course? _____ Yes _____ No X

Which Course? _____

If Revision, Rationale For Revision Should Be Given Here:

2) Is Course Content Similar To Other Courses Now Offered? _____ Yes _____ X No
If Yes, Attach Statement From Chairperson Of Department Offering Similar Course.

3) For Whom Is This Course Designed? Students in the HVAC Certificate Program

4) Required Course? X Yes _____ No Required For HVAC Certificate Program

5) Expected Enrollment Per Term 20 Per Year 20

6) Additional Staff? X Yes _____ No Number Of Additional Staff Part-time coordinator/faculty

7) Additional Space? _____ x Yes _____ No

Amount Of Additional Space Off-site laboratory location to be identified

8) Additional Equipment? _____ Yes _____ X No Additional Cost \$ _____

9) Additional LRC Materials? _____ x Yes _____ No Estimated Cost \$ 500.00

Signature: _____ (Library Services Director)

10) **Text And Related Materials**

The following textbooks are required.

ASHRAE Standard 15 – Safety Standard for Refrigeration Systems
American Society of Heating, Refrigeration and Air Conditioning Engineers
ISSN 1041-2336
www.ashrae.org

Commonwealth of Massachusetts Refrigeration Regulations
522 CMR 9.00
528 CMR 10.00 – 13.00
528 CMR 10.00

11) **Attach Course Description And Outline To This Page**

12) **CIP Code**

47.02

QUINSIGAMOND COMMUNITY COLLEGE

COURSE DESCRIPTION:

HVC 104 Massachusetts Refrigeration Code

4 credits

This class explores the regulations of the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE 15) and the Refrigeration Safety Code to ensure that systems are assembled and installed to code specifications as well as being safe for buildings and its occupants. Laboratory exercises apply ASHRAE 15 and Environmental Protection Agency regulations to shop-built projects that illustrate compliance in both installation and service procedures. This course includes a laboratory component.

Prerequisite: HVC 103

Recommended:

A. Desired Student Outcomes/Instructional Objectives

Student Learning Outcomes/Competencies

Upon successful completion of this course, students are expected to demonstrate mastery in these areas:

1. Students will demonstrate safe lab practices;
2. Students apply knowledge of safety codes to refrigeration applications;
3. Students interpret the intentions of MA C.M.R.s for licensing purposes;
4. Students apply standards of 528 CMR 11.00. Part 6 ASME/ANSI to installation methods used on refrigeration systems;
5. Students analyze the intent of the ANSI/ASHRAE STANDARD 15 – 2004 Code;
6. Students identify refrigerant safety classifications;
7. Students identify refrigeration cycles and individual components for correct application;
8. Students apply knowledge of refrigeration mechanisms design and installation to new applications;
9. Students identify system requirements for code compliance;
10. Students compare refrigerant properties to determine proper applications;
11. Students apply knowledge of Federal EPA Regulations in order to perform refrigerant procedures legally and safely;

B. Course Academic Requirements and Teaching Approach

1. Students are expected to attend every class. Students who must miss a class are responsible for any assignments due for that class, and must contact the instructor in person or by e-mail to get the assignments due for the next class. Students may obtain assignments ahead of time for unavoidable, excusable absences. Missed exams or quizzes due to a justified absence must be made up as soon as possible, typically within the day of the student's return to class.
2. Assigned readings and/or exercises for a class are required and must have been completed by the assigned deadline
3. Students are expected to participate in class exercises and discussion.
4. Students are required to take all quizzes and exams and a final exam, as scheduled.
5. Students are expected to complete all assigned lab projects by their specified deadlines. A brief extension may be granted only in case the submitted work, albeit incomplete, shows sufficient progress and promise of completion.

Teaching approach

The class will be conducted as a combination of classroom lecture, hands-on lab projects, and collaborative interactions.

Theoretical presentations will be followed by practical hands-on lab exercises, under the instructor's supervision.

C. Required Textbooks:

The following textbooks are required:

ASHRAE Standard 15 – Safety Standard for Refrigeration Systems

American Society of Heating, Refrigeration and Air Conditioning Engineers

ISSN 1041-2336

www.ashrae.org

Commonwealth of Massachusetts

Refrigeration Regulations

522 CMR 9.00

528 CMR 10.00

528 CMR 11.00 – 13:00

D. Course Outline

Week One

Introduction to the course: syllabus,

Overview of State and Federal Safety Standards

522 CMR 9.00. Refrigeration and Air Conditioning Systems

Reading Assignments:

Class notes

522 CMR 9.00 Refrigeration and Air Conditioning Systems

Quiz

Week Two

Board of Pipefitters and Refrigeration Technicians Regulations

Reading Assignments:

Class notes

528 CMR 11.00 – 13:00

Quiz

Week's Three, Four

Power Piping

Reading Assignments:

Class notes

528 CMR 11.00. Part 6 ASME/ANSI B3.1

Quiz

Week Five

Introduction to **ANSI/ASHRAE STANDARD 15 - 2004**

Reading Assignments:

Class notes

ANSI/ASHRAE STANDARD 15 - 2004

- Section One - Purpose and History

- Section Two - Scope
- Section Three - Definitions
- Section Four - Occupancy Classifications
- Section Five - Refrigerating Systems Classifications

Quiz

Week Six

Refrigerants and Safety Classifications.

Reading Assignments:

Class notes

ANSI/ASHRAE Standard 15 – 2004 (cont.)

- Section Six - Refrigerant Safety Classifications
- Section Seven – Restrictions on Refrigerant use

Quiz

Exam # 1

Week Seven

Basic Refrigeration Cycle Components

Reading Assignments:

Handouts

Quiz

Week Eight

System Design and Construction

Reading Assignments:

Class notes

ANSI/ASHRAE Standard 15 – 2004 (cont.)

Section Nine - Design and Construction of Equipment and Systems

Quiz

Week's Nine, Ten

System Equipment and Requirements

Reading Assignments:

Class notes

ANSI/ASHRAE Standard 15 – 2004 (cont.)

- Section Ten – Operating and Testing
- Section Eleven – General Requirements
- Section Twelve – Precedence With Conflicting Requirements
- Section Thirteen – Listed Equipment
- Appendices A through F

Quiz

Week Ten

New Refrigerants

Reading Assignments:

Class notes

Class Handouts

Quiz

Week Eleven

Refrigerant Properties and Characteristics

Reading Assignments:

Class notes
Class Handouts

Quiz

Exam #2

Week Twelve

EPA CLEAN AIR ACT - SECTION 608

Implications of Section 608 to the Mass Refrigeration Code
Type One - Small Appliances

Reading Assignments:

Class notes
Class Handouts

Quiz

Week Thirteen

EPA CLEAN AIR ACT - SECTION 608

Type Two – High Pressure Appliances

Reading Assignments:

Class notes
Class Handouts

Quiz

Week Fourteen

EPA CLEAN AIR ACT - SECTION 608

Type Three – Low Pressure Appliances

Reading Assignments:

Class notes
Class Handouts

Quiz

Week Fifteen

EPA CLEAN AIR ACT - SECTION 608

Reading Assignments:

Class notes
Class Handouts

Quiz

EPA CLEAN AIR ACT - SECTION 608 – Proctored Exam

FINAL EXAM AS SCHEDULED!

D. Method of Evaluation

Final grades for this course will be based on the following:

Exam 1:	10%
Exam 2:	10%
Final Exam:	30%
Fourteen Quizzes:	20% (all worth the same)
Lab Projects:	30% (all worth the same)

Lab Project Criteria

- All lab projects must meet current industry standards for workmanship and safety
- All lab projects will be further judged on by specific rubrics given for each project

Plagiarism

- Submitted assignments are expected to be the product of the student's individual and original effort.

Final course grade will follow the QCC grading system as published on page 41 of the 2010/2011 College catalog.

Assessment Plan

WEEK	TOPIC	LEARNING OUTCOME	INSTRUCTIONAL METHODOLOGY	FACULTY RESOURCES	STUDENT RESOURCES	PRE ASSESSMENT	POST ASSESSMENT
Week 1	Introduction to the course: syllabus, Overview of State and Federal Safety Standards 522 CMR 9.00. Refrigeration and Air Conditioning Systems	1. Students demonstrate safe lab practices; 2. Students apply knowledge of safety codes to refrigeration applications	Lecture Group work Lab work: Installation of Air Conditioning Systems to code appropriate applications	Course textbooks Class Handouts	Course textbooks	Class Q/A	Quiz Exam # 1 Final exam
Week 2	Board of Pipefitters and Refrigeration Technicians Regulations	Students interpret the intentions of MA C.M.R.s for licensing purposes	Lecture Group work Lab work: Installation of Air Conditioning Systems to code appropriate applications	Course textbooks Class Handouts	Course textbooks	Class Q/A	Quiz Exam # 1 Final exam
Week 3	Power Piping	Students apply standards of 528 CMR 11.00. Part 6 ASME/ANSI to installation methods used on refrigeration systems	Lecture Group work Lab work: Installation of refrigeration systems to code appropriate applications	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
Week 4	Power Piping (Cont.)	Students apply standards of 528 CMR 11.00. Part 6 ASME/ANSI to installation methods used on refrigeration systems	Lecture Group work Lab work: Installation of refrigeration systems to code appropriate applications	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam

Week Five	Introduction to ANSI/ASHRAE STANDARD 15 - 2004	Students analyze the intent of the ANSI/ASHRAE STANDARD 15 – 2004 Code	Lecture Group work Lab work: Installing compressor safety controls	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1
Week Six	Refrigerants and Safety Classifications	Students identify refrigerant safety classifications	Lecture Group work Lab Work: Installing compressor safety controls	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
Weeks Seven	Basic Refrigeration Cycle Components	Students identify refrigeration cycles and individual components for correct application	Lecture Group work Lab Work: Installing compressor safety controls	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Eight	System Design and Construction	Students apply knowledge of refrigeration mechanisms design and installation to new applications	Lecture Group work Lab Work: Installing compressor safety controls	Course Textbooks Class handouts	Course Textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Nine	System Equipment and Requirements	Students identify system requirements for code compliance	Lecture Group work Lab Work: Installing compressor safety controls	Course Textbooks Class handouts	Course Textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Ten	System Equipment and Requirements (Cont.)	Students identify system requirements for code compliance	Lecture Group work Lab Work: Installing compressor safety controls	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam

Week Eleven	Refrigerant Properties and Characteristics	Students compare refrigerant properties to determine proper applications	Lecture Group work Lab work: Performing proper refrigerant charging procedures	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Twelve	EPA CLEAN AIR ACT - SECTION 608 Implications of Section 608 to the Mass Refrigeration Code Type One - Small Appliances	Students apply knowledge of Federal EPA Regulations in order to perform refrigerant procedures legally and safely	Lecture Group work Lab work: Performing Type One refrigerant procedures	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz EPA Exam Final Exam
Week Thirteen	EPA CLEAN AIR ACT - SECTION 608 Type Two – High Pressure Appliances	Students apply knowledge of Federal EPA Regulations in order to perform refrigerant procedures legally and safely	Lecture Group work Lab work: Performing Type Two refrigerant procedures	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz EPA Exam Final Exam
Week Fourteen	EPA CLEAN AIR ACT - SECTION 608 Type Three – Low Pressure Appliances	Students apply knowledge of Federal EPA Regulations in order to perform refrigerant procedures legally and safely	Lecture Group work Lab work: Performing Type Three refrigerant procedures	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz EPA Exam Final Exam
Week Fifteen	EPA CLEAN AIR ACT - SECTION 608 Review	Students review Federal EPA Regulations in order to perform refrigerant procedures legally and safely	Lecture Group work Lab work: Performing leak detection procedures	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz EPA Exam Final Exam

**QUINSIGAMOND COMMUNITY COLLEGE
COURSE APPROVAL/REVISION
CURRICULUM APPROVAL/REVISION
PROGRAM REVISION
ACTION FORM**

- 1. **Course/Program Title:** HVC 105 Massachusetts Electrical Code
- 2. **Originator:** Robert Recko for the Business & Technology Division **Date:** 9.9.10
- 3. **Academic Unit Dean:** Kathy Rentsch **Date:** 9.16.10
- 4. **Recommendation:** HVC 105 Massachusetts Electrical Code

Rationale: This course will provide the knowledge of the Massachusetts Refrigeration Code (ASHRAE 15) which is required to be applied to the installation of all refrigeration systems to ensure safety. Development of this course as part of the HVAC Certificate was approved at the May 11, 2010 Academic Affairs Committee meeting.

This proposal was approved at the September 16, 2010 meeting of the Business & Technology Division.

4. **Recommended:** _____ **Not Recommended:** _____

Academic Affairs Staff: _____ **Date:** _____

Comments:

5. **Recommended:** _____ **Not Recommended:** _____

VP/Academic Affairs: _____ **Date:** _____

Comments:

6. **Recommended:** _____ **Not Recommended:** _____

Academic Affairs Committee _____ **Date:** _____

Comments:

7. **Approved:** _____ **Not Approved:** _____

VP/Academic Affairs: _____ **Date:** _____

Comments:

**Quinsigamond Community College
Request for a New Course or Course Revision**

Course Discipline Heating, Ventilation and Air Conditioning Division Business & Technology

Date 9.16.10

Course Title Massachusetts Electrical Code Course Number HVC 105

Lecture Hours 45 Credits 4 Clinic Hrs 0 Lab Hrs 45

Prerequisite HVC 104 Corequisite none

Application As Elective? no

Course Effective Term Spring Year Academic year 2011

1) Does This Course Replace Another Course? _____ Yes _____ No X

Which Course? _____

If Revision, Rationale For Revision Should Be Given Here:

2) Is Course Content Similar To Other Courses Now Offered? _____ Yes _____ X No
If Yes, Attach Statement From Chairperson Of Department Offering Similar Course.

3) For Whom Is This Course Designed? Students in the HVAC Certificate Program

4) Required Course? X Yes _____ No Required For HVAC Certificate Program

5) Expected Enrollment Per Term 20 Per Year 20

6) Additional Staff? X Yes _____ No Number Of Additional Staff Part-time coordinator/faculty

7) Additional Space? _____ x Yes _____ No

Amount Of Additional Space Off-site laboratory location to be identified

8) Additional Equipment? _____ Yes _____ X No Additional Cost \$ _____

9) Additional LRC Materials? _____ x Yes _____ No Estimated Cost \$ 500.00

Signature: _____ (Library Services Director)

10) Text And Related Materials

The following textbooks are required.

National Electrical Code (NEC) 2008
National Fire Protection Association (NFPA) 70
ISBN: 0-87765-793-9
ISBN13: 978-0-87765-793-4

11) Attach Course Description And Outline To This Page

12) CIP Code

47.02

QUINSIGAMOND COMMUNITY COLLEGE

COURSE DESCRIPTION:

HVC 105 Massachusetts Electrical Code

4 credits

This course covers wiring practices required by the Mass. Electrical Code (National Electrical Code) as they apply to the wide variety of heating, ventilation, air conditioning, and refrigeration equipment. Laboratory exercises demonstrate the application of these practices on controls, relays, timers, motors, circuit protection and electrical supplies for safety and functionality. This course includes a laboratory component.

Prerequisite: HVC 104

Recommended:

A. Desired Student Outcomes/Instructional Objectives

Student Learning Outcomes/Competencies

Upon successful completion of this course, students are expected to demonstrate mastery in these areas:

1. Students demonstrate safe lab practices;
2. Students apply knowledge of safety practices from electrical codes to HVAC/R applications;
3. Students identify areas where electrical code requirements apply;
4. Students identify and apply approved wiring practices;
5. Students identify electrical conductors for proper application;
6. Students calculate and select conductors for a given application
7. Students demonstrate proper and safe grounding practices;
8. Students identify terms and language used to interpret electrical code requirements;
9. Students apply knowledge of Motor Circuit Conductors used in HVAC/R systems;
10. Students define terminology applied to HVAC/R electrical equipment;
11. Students identify Motor Circuit Controls for HVAC/R systems;
12. Students define terminology applied to HVAC/R electrical equipment
13. Students apply knowledge of HVAC/R Branch Circuit Conductors for safe and proper installations;
14. Students define terminology applied to HVAC/R Low Voltage Controls
15. Students determine power limits for low voltage transformers and control circuits
16. Students apply knowledge of Motor Branch Circuits to identify and select proper conductors and protection devices

B. Course Academic Requirements and Teaching Approach

1. Students are expected to attend every class. Students who must miss a class are responsible for any assignments due for that class, and must contact the instructor in person or by e-mail to get the assignments due for the next class. Students may obtain assignments ahead of time for unavoidable, excusable absences. Missed exams or quizzes due to a justified absence must be made up as soon as possible, typically within the day of the student's return to class.
2. Assigned readings and/or exercises for a class are required and must have been completed by the assigned deadline
3. Students are expected to participate in class exercises and discussion.
4. Students are required to take all quizzes and exams and a final exam, as scheduled.
5. Students are expected to complete all assigned lab projects by their specified deadlines. A brief extension may be granted only in case the submitted work, albeit incomplete, shows sufficient progress and promise of completion.

Teaching approach

The class will be conducted as a combination of classroom lecture, hands-on lab projects, and collaborative interactions.

Theoretical presentations will be followed by practical hands-on lab exercises, under the instructor's supervision.

C. Required Textbooks:

National Electrical Code (NEC) 2008
National Fire Protection Association (NFPA) 70
ISBN: 0-87765-793-9
ISBN13: 978-0-87765-793-4

D. Course Outline

Week One

Introduction to the course: syllabus,
Overview of State and Federal Electrical Standards
MA Addendum 527 CMR 12.00
Basic Wiring Methods

Reading Assignments:

Class notes
NEC 2008 - 527 CMR 12.00
NEC 2008 – Article 90 & Article 100

Quiz

Week Two

Requirements for Electrical Installations

Reading Assignments:

Class notes
NEC 2008 – Article 110 & Article 200

Quiz

Week Three

Basic Wiring Methods

Reading Assignments:

Class notes
NEC 2008 - 527 CMR 12.00
NEC 2008 – Article 300.00 – 300.50 – Wiring Methods

Quiz

Week Four

Conductors for General Wiring

Reading Assignments:

Class notes
NEC 2008 – Article 310.00 – 310.60

Quiz

Week Five

Circuit Ampacities and Wire Sizing

Reading Assignments:

Class notes

NEC 2008 – Article 310.00 – 310.60

Quiz

Week Six

Grounding

Reading Assignments:

Class notes

NEC 2008 – Article 250.00 – 250.118

Quiz

Week Seven

Definitions of Motors and Motor Circuits

Reading Assignments:

Class notes

NEC 2008 – Article 430.00 – 430.18

Quiz

Week Eight

Motor Circuit Conductors

Reading Assignments:

Class notes

NEC 2008 – Article 430.21 – 430.29

Quiz

Exam # 1

Week Nine

Motor Branch Circuit Protection

Reading Assignments:

Handouts

NEC 2008 – Article 430.31 – 430.63

Quiz

Week Ten

Motor Circuit Controls

Reading Assignments:

Class notes

NEC 2008 – Article 430.71 – 430.126

Quiz

Week's Eleven

Higher Voltages and Grounding

Reading Assignments:

Class notes

NEC 2008 – Article 430.221 – 430.244

Quiz

Week Twelve

Air Conditioning and Refrigeration Equipment

Definitions

Reading Assignments:

Class notes

NEC 2008 – Article 440.00 – 440.22

Quiz

Week Thirteen

HVAC/R Branch Circuit Conductors

Reading Assignments:

Class notes

NEC 2008 – Article 440.00 – 440.65

Quiz

Week Fourteen

Low Voltage Controls

Reading Assignments:

Class notes

NEC 2008 – Article 720-725

Quiz

Week Fifteen

Low Voltage Controls

Low Voltage Transformers

Reading Assignments:

Class notes

NEC 2008 – Article 720-725

Quiz

Exam #2

FINAL EXAM AS SCHEDULED!

D. Method of Evaluation

Final grades for this course will be based on the following:

Exam 1:	10%
Exam 2:	10%
Final Exam:	30%
Fifteen Quizzes:	20% (all worth the same)
Lab Projects:	30% (all worth the same)

Lab Project Criteria

- All lab projects must meet current industry standards for workmanship and safety
- All lab projects will be further judged on by specific rubrics given for each project

Plagiarism

- Submitted assignments are expected to be the product of the student's individual and original effort.

Final course grade will follow the QCC grading system as published on page 41 of the 2010/2011 College catalog.

Assessment Plan

WEEK	TOPIC	LEARNING OUTCOME	INSTRUCTIONAL METHODOLOGY	FACULTY RESOURCES	STUDENT RESOURCES	PRE ASSESSMENT	POST ASSESSMENT
Week 1	Introduction to the course: syllabus, Introduction to the course: syllabus, Overview of State and Federal Electrical Standards for HVAC/R Systems	1. Students demonstrate safe lab practices; 2. Students apply knowledge of safety practices from electrical codes to HVAC/R applications	Lecture Group work Lab work: Basic wiring connections	Course textbooks Class Handouts	Course textbooks	Class Q/A	Quiz Exam # 1 Final exam
Week 2	Requirements for Electrical Installations	Students identify areas where code requirements apply	Lecture Group work Lab work: Wire sizes (AWG)	Course textbooks Class Handouts	Course textbooks	Class Q/A	Quiz Exam # 1 Final exam
Week 3	Basic Wiring Methods	Students identify and apply approved wiring practices	Lecture Group work Lab work: Basic Circuit Rules	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
Week 4	Conductors for General Wiring	Students identify electrical conductors for proper application	Lecture Group work Lab work: Grounding Methods	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
Week Five	Circuit Ampacities and Wire Sizing	Students calculate and select conductors for a given application	Lecture Group work Lab work: Condensing Units Wiring	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1

Week Six	Grounding	Students identify proper grounding practices and applications for safe operation	Lecture Group work Lab Work: Circuit Protection	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
Weeks Seven	Definitions of Motors and Motor Circuits	Students identify terms and language used to interpret code requirements	Lecture Group work Lab Work: Circuit Ampacities Wire Sizing Protection Selection	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #1 Final Exam
Week Eight	Motor Circuit Conductors	Students apply knowledge of Motor Circuit Conductors used in HVAC/R systems	Lecture Group work Lab Work: Installing compressor safety controls	Course Textbooks Class handouts	Course Textbooks	Class Q/A	Quiz Exam #1 Final Exam
Week Nine	Motor Branch Circuit Protection	Students apply knowledge of Motor Branch Circuits to identify and select proper conductors and protection devices	Lecture Group work Lab Work: Installing compressor safety controls	Course Textbooks Class handouts	Course Textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Ten	Motor Circuit Controls	Students identify Motor Circuit Controls for HVAC/R systems	Lecture Group work Lab Work: Installing compressor safety controls	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Eleven	Higher Voltages and Grounding	Students demonstrate safe grounding practices	Lecture Group work Lab work: Wiring Air Handlers	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam

Week Twelve	Air Conditioning and Refrigeration Equipment	Students define terminology applied to HVAC/R electrical equipment	Lecture Group work Lab work: Wiring Transformers	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Thirteen	HVAC/R Branch Circuit Conductors	Students apply knowledge of HVAC/R Branch Circuit Conductors for safe and proper installations	Lecture Group work Lab work: Wiring Low Voltage Controls	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Fourteen	Low Voltage Controls	Students define terminology applied to HVAC/R Low Voltage Controls	Lecture Group work Lab work: Wiring Low Voltage Controls	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam
Week Fifteen	Low Voltage Controls Low Voltage Transformers	Students determine power limits for low voltage transformers and control circuits	Lecture Group work Lab work: Wiring Heat Pumps	Course textbooks Class handouts	Course textbooks	Class Q/A	Quiz Exam #2 Final Exam

Heating, Ventilation and Air Conditioning - Certificate

PROPOSED

Course Title	Course #	Offered	Plan to Take	Grade	Credits	Prerequisites
Cluster A						
Basic Refrigeration Systems and Heat Theory	HVC 101				4	HVC 101 HVC 102 HVC 103 HVC 104
Basic Electricity	HVC 102				4	
Air Conditioning Systems	HVC 103				5	
Mass. Refrigeration Code	HVC 104				4	
Mass. Electrical Code	HVC 105				4	
Total credits required					17	

QUINSIGAMOND COMMUNITY COLLEGE

COURSE REVISION PROPOSAL

1. **Course Name & Number:** MNT 101 Mechanical CAD I

2. **Originator:** Gary Magiera and Lee Duerden **Date:** 8.25.10

3. **Division Dean:** Kathy Rentsch **Date:** 9.16.10

4. **Brief Description of the Proposal:**

Change course description to include topic areas addressed in the Massachusetts Drafting/CAD Articulation Agreement. New topic areas will also align QCC's MNT 101 content with that of other Massachusetts community colleges.

5. **Effective Date:** Spring 2011

6. **Division Recommendation:**

This proposal was approved at the September 16, 2010 meeting of the Business & Technology Division.

7. **Academic Affairs Staff:** _____ **Date:** _____

Recommended: _____ **Not Recommended:** _____

Comments:

8. **VP/Academic Affairs:** _____ **Date:** _____

Recommended: _____ **Not Recommended:** _____

Comments:

9. **Academic Affairs Committee:** _____ **Date:** _____

Recommended: _____ **Not Recommended:** _____

Comments:

10. **VP/Academic Affairs:** _____ **Date:** _____

Approved: _____ **Not Approved:** _____

Comments:

Course Revision Proposal

Type of revision:							
X	Description	Prerequisite	Corequisite	Number	Title	# Credits	Elective Type
Other (explain)							
Course Discipline or Department: Manufacturing Technology				Division: Business & Technology			
Current Course Title: Mechanical CAD I							
Current Course Number: MNT 101							
Current Course Description (as it appears in the College catalog): This course introduces computer-aided design (CAD) software. Students explore commands needed to produce a two-dimensional drawing. Topics include drawing setup, geometry creation, editing functions, layer setups, basic dimensioning, viewports, model and paper space, title block creation, and how to display, print and plot a completed drawing. Students gain proficiency in the operation of a PC-based CAD system and a functional understanding of basic computer-aided drafting techniques. Prerequisite: CIS 111 or CIS 115 or Approval of Program Coordinator. F/S							
Proposed Description (include all proposed changes): This course introduces computer-aided design (CAD) software. Students develop an understanding of the commands needed to produce a two-dimensional drawing. Topics include drawing setup, geometry creating, editing functions, layer techniques, dimensioning, model and paper space, title block creation, and plotting a completed drawing. Other related topics include multi-view drawings, selection and arrangement of orthographic views, section and auxiliary views, and isometric and oblique drawings. Students gain proficiency in the operation of a PC-based CAD system and a functional understanding of basic computer-aided drafting techniques. Prerequisite: CIS 111 or CIS 115 or Approval of Program Coordinator. F/S							
Rationale for the change: Changes were recently made to the Massachusetts Drafting/CAD State Articulation Agreement. These changes will allow students graduating from career vocational technical education programs and meeting community college enrollment criteria to transfer high school credits to any Massachusetts community college. The proposed changes are necessary in order for topic areas of QCC's MNT 101 Mechanical Cad I course to match those of the articulation agreement, as well as subject matter taught at other community colleges.							
For change in the number of credits, provide a description of the change in course content.							
Does the proposed change affect another department? Yes No X							
If yes, explain, and please confer with the coordinator of the affected department.							
If this change affects a program grid, please submit a Program Revision Proposal.							