HVACR 102 Course Outline as of Fall 2024

CATALOG INFORMATION

Dept and Nbr: HVACR 102 Title: HVACR SYSTEM COMPONENTS
Full Title: Residential HVACR System Components
Last Reviewed: 11/27/2023

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	2.00	17.5	Lecture Scheduled	35.00
Minimum	3.00	Lab Scheduled	3.00	6	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	5.00		Contact Total	87.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 70.00 Total Student Learning Hours: 157.50

Title 5 Category:	AA Degree Applicable
Grading:	Grade or P/NP
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	

Catalog Description:
In this course, students will study the electrical and mechanical components of residential heating and air-conditioning systems, including system controls, motors, compressors, refrigerants, and sensors. This course prepares students for the Environmental Protection Agency's EPA 608 examination for safe refrigerant handling.

Students with previous experience in the HVACR industry may be prepared for the more advanced HVACR courses. Contact the instructor or Department Chair for more information.

Prerequisites/Corequisites:

Recommended Preparation:
Course Completion or Concurrent Enrollment in HVAC 101 (or HVACR 101)

Limits on Enrollment:

Schedule of Classes Information:
Description: In this course, students will study the electrical and mechanical components of residential heating and air-conditioning systems, including system controls, motors,

compressors, refrigerants, and sensors. This course prepares students for the Environmental Protection Agency's EPA 608 examination for safe refrigerant handling.

Students with previous experience in the HVACR industry may be prepared for the more advanced HVACR courses. Contact the instructor or Department Chair for more information. (Grade or P/NP)
Prerequisites/Corequisites:
Recommended: Course Completion or Concurrent Enrollment in HVAC 101 (or HVACR 101)
Limits on Enrollment:
Transfer Credit:
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**	Effective:	Inactive:
CSU GE:	**Transfer Area**	Effective:	Inactive:
IGETC:	**Transfer Area**	Effective:	Inactive:

CSU Transfer:	Effective:	Inactive:
UC Transfer:	Effective:	Inactive:

CID:

Certificate/Major Applicable:
Certificate Applicable Course

Approval and Dates

Version:	02	Course Created/Approved:	1/24/2022
Version Created:	8/24/2023	Course Last Modified:	6/25/2024
Submitter:	Benjamin Goldstein	Course last full review:	11/27/2023
Version Status:	Approved (Changed Course)	Prereq Created/Approved:	11/27/2023
Version Status Date:	11/27/2023	Semester Last Taught:	
Version Term Effective:	Fall 2024	Term Inactive:	Summer 2025

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Identify and describe key system components in air-conditioning and heating systems.
2. Identify and describe refrigerant systems and how temperature, pressure, and heat affect refrigerants.
3. Explain common joining methods with copper, steel, and PVC.

Objectives:
At the conclusion of this course, the student should be able to:
1. Describe the various components of residential Heating, Ventilation, Air Conditioning, and Refrigeration (HVACR) systems.
2. Explain the how refrigerants and refrigerant systems work.

3. Demonstrate knowledge of safe and proper handling of refrigerants.

Topics and Scope:

I. Residential HVACR System Components
- A. Heating and cooling components
  1. HVAC cooling components
  2. Compressors
  3. Diagnosing compressor problems
  4. Evaporators and condensers
  5. Metering devices
  6. Refrigeration system accessories
  7. HVAC heating components
- B. Motors
  1. HVAC motors
  2. AC motor lab
  3. Aftermarket motors
  4. Aftermarket parts
  5. Contactors and motor starters
  6. Compressor starting relays and capacitors
  7. Troubleshooting motors
- C. Controls and electronics
  1. Residential HVAC controls
  2. Thermostats and heating controls
  3. Solid state electronics
- D. Piping and ductwork
  1. Basic construction for trades
  2. Ductwork fabrication and installation overview
  3. Hot work
  4. Copper joining methods
  5. Steel joining methods lab
  6. PVC/CPVC joining methods lab
- E. Basic maintenance

II. Refrigerants and Refrigerant Systems
- A. Refrigerant systems
- B. Charging
- C. Leak checks
- D. Evaluation

III. EPA 608 Certification Test Preparation

The Topics and Scope above will be covered in an integrated lecture and lab environment.

Assignment:

Lecture-Related Assignments:
1. Weekly reading (10-30 pages) or instructional videos
2. Problem sets (10-20)
3. Quizzes (5-10)
4. Midterm
5. Final exam

Lab-Related Assignments:

1. Skills demonstrations (5-10)
2. Lab activities (5-10)

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments and skill demonstrations are more appropriate for this course.	Writing 0 - 0%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Problem sets; lab activities	Problem solving 10 - 40%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Skill demonstrations	Skill Demonstrations 20 - 40%

Exams: All forms of formal testing, other than skill performance exams.

Quizzes; midterm; final exam	Exams 20 - 30%

Other: Includes any assessment tools that do not logically fit into the above categories.

Participation; lab activities	Other Category 20 - 30%

Representative Textbooks and Materials:
This course will utilize HVACR industry instructional training materials.

OTHER REQUIRED ELEMENTS

STUDENT PREPARATION

Matric Assessment Required:	X	Exempt From Assessment
Prerequisites-generate description:	NP	No Prerequisite
Advisories-generate description:	A	Auto-Generated Text
Prereq-provisional:	N	NO
Prereq/coreq-registration check:	N	No Prerequisite Rules Exist
Requires instructor signature:	N	Instructor's Signature Not Required

BASIC INFORMATION, HOURS/UNITS & REPEATABILITY

Method of instruction:	02	Lecture
	04	Laboratory
	71	Internet-Based, Simultaneous Interaction
	72	Internet-Based, Delayed Interaction
Area department:	INDTRA	Industrial & Trade Technology
Division:	73	Science, Technology, Engineering & Mathematics
Special topic course:	N	Not a Special Topic Course
Program status:	1	Certificate Applicable Course
Repeatability:	00	Two Repeats if Grade was D, F, NC, or NP
Repeat group id:		

SCHEDULING

Audit allowed:	N	Not Auditable
Open entry/exit:	N	Not Open Entry/Open Exit
Credit by exam:	N	Credit by examination not allowed
Budget code: Program:	0000	Unrestricted
Budget code: Activity:	0936	Environmental Control Tech

OTHER CODES

Discipline:	Air Conditioning, Refrigeration, Heating OR Construction Technology	
Basic skills:	N	Not a Basic Skills Course
Level below transfer:	Y	Not Applicable
CVU/CVC status:	Y	Distance Ed, Not CVU/CVC Developed
Distance Ed Approved:	Y	Either online or hybrid, as determined by instructor
Emergency Distance Ed Approved:	N	None
Credit for Prior Learning:	N	Agency Exam
	N	CBE
	N	Industry Credentials
	N	Portfolio
Non-credit category:	Y	Not Applicable, Credit Course
Classification:	Y	Career-Technical Education
SAM classification:	C	Clearly Occupational
TOP code:	0946.10	Energy Systems Technology
Work-based learning:	N	Does Not Include Work-Based Learning
DSPS course:	N	Not a DSPS Course

In-service:	N	Not an in-Service Course
Lab Tier:	21	Credit Lab - Tier 1