

**STATE UNIVERSITY OF NEW YORK  
COLLEGE OF TECHNOLOGY  
CANTON, NEW YORK**



**MASTER SYLLABUS**

**COURSE NUMBER – COURSE NAME  
MECH103 – Intro to HVACR**

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**Updated by:**

**Canino School of Engineering Technology**

**Department: Mechanical & Energy Systems**

**Semester/Year: 2019**

- A. **TITLE:** Intro to HVACR
- B. **COURSE NUMBER:** MECH103
- C. **CREDIT HOURS:** (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)

# Credit Hours: 3  
# Lecture Hours: 2 per week  
# Lab Hours: (1) three-hour lab per week  
Other: per week

Course Length: 15 Weeks

- D. **WRITING INTENSIVE COURSE:** Yes  No
- E. **GER CATEGORY:** None:  Yes: GER  
*If course satisfies more than one:* GER
- F. **SEMESTER(S) OFFERED:** Fall  Spring  Fall & Spring

G. **COURSE DESCRIPTION:**

This course is an introduction to heating and air conditioning systems used to achieve a comfortable indoor environment. It includes a straightforward study of heating and cooling loads and the applicable heat transfer processes. The concepts of air and water heating/ cooling systems and related controls are studied to provide students the baseline knowledge to continue their technical training. The topic of Indoor Air Quality of a building is introduced along with ASHRAE standards. Two hours lecture, two hours laboratory per week.

- H. **PRE-REQUISITES:** None  Yes  If yes, list below:

**CO-REQUISITES:** None  Yes  If yes, list below:

**I. STUDENT LEARNING OUTCOMES: (see key below)**

By the end of this course, the student will be able to:

<b><u>Course Student Learning Outcome</u></b> <b><u>[SLO]</u></b>	<b><u>Program Student Learning Outcome</u></b> <b><u>[PSLO]</u></b>	<b><u>GER</u></b> <i>[If Applicable]</i>	<b><u>ISLO &amp; SUBSETS</u></b>	
MECH103.1 Heat transfer Demonstrate understanding of basic heat transfer as it applies to HVAC			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
MECH103.2 AC control circuits and components Students demonstrate an understanding of electrical control components and circuits			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
MECH103.3 HVAC Concepts Students can explain introductory heating and cooling system concepts			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
MECH103.4 Heating/ Cooling Load Students can perform a block heating load			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
MECH103.5 Psychrometrics ( part of Outcome) Students demonstrate the use of equipment to measure pressure, temperature, and humidity			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
MECH103.6 System Equilibrium and Balancing ( part of Outcome) Students can perform a heat balance on a system and report on the results			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets

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			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets

KEY	<u>Institutional Student Learning Outcomes [ISLO 1 – 5]</u>
ISLO #	ISLO & Subsets
1	<b>Communication Skills</b> Oral [O], Written [W]
2	<b>Critical Thinking</b> <i>Critical Analysis [CA], Inquiry &amp; Analysis [IA], Problem Solving [PS]</i>
3	<b>Foundational Skills</b> <i>Information Management [IM], Quantitative Lit./Reasoning [QTR]</i>
4	<b>Social Responsibility</b> <i>Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]</i>
5	<b>Industry, Professional, Discipline Specific Knowledge and Skills</b>

\*Include program objectives if applicable. Please consult with Program Coordinator

J. **APPLIED LEARNING COMPONENT:** Yes  No

If YES, select one or more of the following categories:

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Classroom/Lab | <input type="checkbox"/> Civic Engagement              |
| <input type="checkbox"/> Internship               | <input type="checkbox"/> Creative Works/Senior Project |
| <input type="checkbox"/> Clinical Placement       | <input type="checkbox"/> Research                      |
| <input type="checkbox"/> Practicum                | <input type="checkbox"/> Entrepreneurship              |
| <input type="checkbox"/> Service Learning         | (program, class, project)                              |
| <input type="checkbox"/> Community Service        |  |

K. **TEXTS:**

None required

L. **REFERENCES:**

ASHRAE Fundamentals,  
ASHRAE HVAC Applications,  
Stein, Benjamin, Building Technology, Mechanical & Electrical Systems, 2nd Edition, Wiley,  
1997

M. **EQUIPMENT:** None  Needed:

N. **GRADING METHOD:** A-F

O. **SUGGESTED MEASUREMENT CRITERIA/METHODS:**

Quizzes, homework, hourly exams and a final.

P. **DETAILED COURSE OUTLINE:**

1. Introduction to HVAC
  - 1.1. Safety
  - 1.2. Tools and equipment
  - 1.3. Fundamentals of comfort cooling & heating
2. Science
  - 2.1. Matter
  - 2.2. Energy
  - 2.3. Temperature
  - 2.4. Heat
  - 2.5. Pressure
3. Comfort Heating and Cooling
4. Temperature
5. Humidity, Psychrometrics
6. Air Purity
7. Ventilation, Air Mixtures, Economizers

- 8. Refrigeration Basics
  - 8.1. Sensible & Latent heat
  - 8.2. Refrigerants
  - 8.3. Vapor compression cycle
  - 8.4. Compressors
  - 8.5. Condensers
  - 8.6. Refrigerant metering
  - 8.7. Piping
  - 8.8. Charging and service
- 9. Basic electricity
  - 9.1. Power
  - 9.2. Motors
  - 9.3. Circuits
  - 9.4. Controls
  - 9.5. Schematics
- 10. System components
  - 10.1. Furnaces
  - 10.2. Boilers
  - 10.3. AC split systems
  - 10.4. Heat pumps, packaged units
- 11. System design
  - 11.1. Insulation
  - 11.2. Load calculations
  - 11.3. Air quality
  - 11.4. Air balancing
  - 11.5. Ductwork
  - 11.6. Equipment selection

Q. **LABORATORY OUTLINE:** None  Yes

- 1. Tools of the trade
- 2. Tubing fabrication
- 3. Pressure & temperature measurement
- 4. Multimeter introduction
- 5. Control switches
- 6. Low voltage control
- 7. Insulation
- 8. Airflow 1
- 9. Airflow2
- 10. Heat balance1
- 11. Heat balance 2
- 12. Refrigerant state
- 13. Equipment efficiency 1
- 14. Equipment efficiency 2
- 15. Equipment specification