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

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
MECH103 – Intro to HVACR

Created by: Stan Skowronek

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:

<table>
<thead>
<tr>
<th>Course Student Learning Outcome [SLO]</th>
<th>Program Student Learning Outcome [PSLO]</th>
<th>GER [If Applicable]</th>
<th>ISLO &amp; SUBSETS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH103.1 Heat transfer</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>Demonstrate understanding of basic</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>heat transfer as it applies to</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>HVAC</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>MECH103.2 AC control circuits and</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>components</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>Students demonstrate an understanding</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>of electrical control components and</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>circuits</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>MECH103.3 HVAC Concepts</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>Students can explain introductory</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>heating and cooling system concepts</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>MECH103.4 Heating/ Cooling Load</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>Students can perform a block heating</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>load</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>MECH103.5 Psychrometrics (part of</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>Outcome)</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>Students demonstrate the use of</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>equipment to measure pressure,</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>temperature, and humidity</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>MECH103.6 System Equilibrium and</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>Balancing (part of Outcome)</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>Students can perform a heat balance on</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td>a system and report on the results</td>
<td>ISLO</td>
<td>ISLO</td>
<td>Subsets</td>
</tr>
<tr>
<td></td>
<td>ISLO</td>
<td>ISLO</td>
<td>ISLO</td>
</tr>
<tr>
<td>----------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>ISLO</td>
<td>ISLO</td>
<td>ISLO</td>
</tr>
<tr>
<td></td>
<td>ISLO</td>
<td>ISLO</td>
<td>ISLO</td>
</tr>
<tr>
<td></td>
<td>ISLO</td>
<td>ISLO</td>
<td>ISLO</td>
</tr>
<tr>
<td></td>
<td>ISLO</td>
<td>ISLO</td>
<td>ISLO</td>
</tr>
<tr>
<td>KEY</td>
<td>Institutional Student Learning Outcomes [ISLO 1 – 5]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISLO #</td>
<td>ISLO &amp; Subsets</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1 | Communication Skills  
Oral [O], Written [W] |
| 2 | Critical Thinking  
| 3 | Foundational Skills  
Information Management [IM], Quantitative Lit./Reasoning [QTR] |
| 4 | Social Responsibility  
Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T] |
| 5 | Industry, Professional, Discipline Specific Knowledge and Skills |

*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:

- ☒ Classroom/Lab
- ☐ Internship
- ☐ Clinical Placement
- ☐ Practicum
- ☐ Service Learning
- ☐ Community Service
- ☐ Civic Engagement
- ☐ Creative Works/Senior Project
- ☐ Research
- ☐ Entrepreneurship
  (program, class, project)

K. **TEXTS:**

None required

L. **REFERENCES:**

ASHRAE Fundamentals,
ASHRAE HVAC Applications,

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. Airflow 2
10. Heat balance 1
11. Heat balance 2
12. Refrigerant state
13. Equipment efficiency 1
14. Equipment efficiency 2
15. Equipment specification