




# Program Announcement: Undergraduate Degree Program

**Form 1A**  
Version 2014-11-17

Before submitting a proposal for a new program leading to an undergraduate degree, a SUNY campus must submit a cover letter signed by the Chief Executive or Chief Academic Officer and a completed Program Announcement (PA) to the SUNY Provost at [program.review@suny.edu](mailto:program.review@suny.edu). The PA procedure is described at the end of this form.

Section 1. General Information									
<b>a) Institutional Information</b>	List each campus (and its 6-digit <u>SED Institution Code</u> ) where the entire program will be offered: SUNY Canton SED code: 261000								
<b>b) Program Locations</b>	List the name and address of each off-campus location (e.g., <u>extension site or extension center</u> ) where courses (but not the entire program) will offered, <b>or check here [ X ] if not applicable.</b>  If applicable, send documentation to show that <u>SUNY policy on off-campus locations</u> has been followed.  Will 50% or more of the program be offered at a distance? [ ] Yes [X] No								
<b>c) Proposed Program Information</b>	<table border="1"> <tr> <td>Program Title:</td> <td>HVAC (Heating, Ventilation and Air Conditioning)</td> </tr> <tr> <td><u>Award(s)</u> (e.g., A.A.S., B.A.):</td> <td>AOS Associates Occupational Studies</td> </tr> <tr> <td>Number of Required Credits:</td> <td>Minimum [ ] If tracks or options, largest minimum [ ]</td> </tr> <tr> <td>Proposed Program Codes:</td> <td><u>HEGIS Code</u> [ 5317.00] 6-digit <u>CIP 2010 Code</u> [ 47.0201 ]</td> </tr> </table> <p>If the program will be accredited, list the accrediting agency and expected date of accreditation:</p> <p>If applicable, list the <u>New York State certificate title(s) and type(s)</u> to which the program leads:</p> <p>If applicable, list the New York State <u>professional licensure title(s)</u> to which the program leads:</p>	Program Title:	HVAC (Heating, Ventilation and Air Conditioning)	<u>Award(s)</u> (e.g., A.A.S., B.A.):	AOS Associates Occupational Studies	Number of Required Credits:	Minimum [ ] If tracks or options, largest minimum [ ]	Proposed Program Codes:	<u>HEGIS Code</u> [ 5317.00] 6-digit <u>CIP 2010 Code</u> [ 47.0201 ]
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<b>d) Campus Contact</b>	<p>Name and title: Michael Newtown, P.E., Dean, Canino School of Engineering Technology</p> <p>Telephone: 315-386-7411 E-mail: newtownm@canton.edu</p>								
<b>e) Chief Executive or Chief Academic Officer Approval</b>	<p>Signature affirms that the proposal has met all applicable campus administrative and shared governance procedures for consultation, and the institution's commitment to support the proposed program. <i>E-signatures are acceptable.</i></p> <p>Name and title: Douglas M. Scheidt, Ph.D., Provost and V.P. of Academic Affairs</p> <p>Signature and date:  5.2.13</p> <p><b>If the intended program will be offered jointly with one or more other institutions, provide the following information for each institution:</b></p> <p>Partner institution's name and 6-digit <u>SED Code</u>:</p> <p>Name, title, and signature of partner institution's CEO (or <b>append</b> a signed letter indicating approval of this proposal):</p>								

## Section 2. Program Summary

This program of study will allow students who wish to complete the a trades related HVAC&R (Heating, Ventilation, Air Conditioning, and Refrigeration) program the ability to do so without completing two certificates at SUNY Canton. HVAC&R is increasingly modernizing with electronic controls and our students will gain more skills and practice to better serve the industry.

Expected Enrollment	When Program Begins	In Year 5
Full-time students	30	45
Part-time students	5	10

## Section 3. Curriculum

Provide a list of all courses in the curriculum (including Liberal Arts and Sciences, SUNY General Education Requirement, Transfer Path courses) to show the entire structure and content of the program. Expand or duplicate this table as needed for tracks, concentrations and specializations.

Lower Division		Upper Division (as applicable)	
Course Title	Credits	Course Title	Credits
MATH 106 - Intermediate Algebra	3		
ENGL 101 – Composition and the Spoken Word	3		
HVAC 103 Heating Systems I	3		
HVAC 104 Heating Systems Lab I	5		
SOET 101 Intro to Computer Usage for Technicians	1		
HVAC 105 Heating Systems II	3		
HVAC 106 Residential & Light Commercial Installation	5		
HVAC 101 Refrigeration I	2		
HVAC 102 Refrigeration Lab I	3		
HVAC 110 Plumbing	4		
HVAC 201 HVAC Electrical & Motor Controls I	2		
HVAC 202 HVAC Electrical & Motor Controls Lab I	3		
HVAC 205 HVAC Service, Troubleshooting and Repair	2		
CONS 151 Building Trades –Blueprint	2		
Humanities Elective	3		
HVAC 201 Commercial Refrigeration	2		
HVAC 202 Commercial Refrigeration Lab II	3		
ACHP 105 Refrigeration System Design	2		
General Elective	3		
GER Social Science	3		



**Optional, Illustrative Questions to Consider:****For other SUNY campuses responding to the Program Announcement**

• Do you have a similar or related program? • What has been your experience with the program? • Would the introduction of this program have any effect, positive or negative, on your institution? If so, please specify. • Do you perceive a need for this kind of program? • Does the program offer an opportunity for articulation or inter-institutional cooperation?

**Your response must be in writing, from your President, and addressed to the President of the proposing campus, with a copy to the SUNY Provost at [program.review@suny.edu](mailto:program.review@suny.edu).**

**Procedure for Program Announcements (PA)**

1. **SCOPE.** A SUNY campus must send a PA to the SUNY Provost at [program.review@suny.edu](mailto:program.review@suny.edu) before submitting a proposal for a new program leading to an undergraduate degree. Unless requested by the SUNY Provost, a PA is not required for a program leading to an undergraduate certificate, for a new program being created by combining existing registered programs (e.g., multi-award programs and/or multi-institution programs), or for a new program being created from a track, specialization, or concentration in a registered program.
2. **SUNY PROVOST'S REVIEW.** The SUNY Provost's Office reviews each PA for accuracy and completeness as well as for substantive issues, such as alignment with campus mission and SUNY policy, and requests changes when needed.
3. **PUBLICATION FOR COMMENTS.** Once a PA is acceptable to the SUNY Provost, it is announced on the SUNY Program Review listserv in a weekly *Program Review Update*, which starts a 30-day intra-SUNY comment period. The listserv includes all campus presidents, chief academic officers, and others upon request. The PA enables other SUNY campuses – particularly those with experience with related programs – to provide information to the proposing campus that can be used to construct a sound program proposal.
4. **COMMENTS FROM OTHER CAMPUSES.** The President of each interested campus must send comments within 30 days of a PA's publication in the *Program Review Update* to the President of the proposing campus, with a copy to the Provost at [program.review@suny.edu](mailto:program.review@suny.edu). Comments may include advice and suggestions about possible articulation opportunities, enrollment trends in related programs, and opportunities for cooperation, as well as concerns or objections.
5. **FOLLOWING THE COMMENT PERIOD.** Once the 30-day comment period for a PA ends, and any concerns and/or objections have been resolved, the campus may prepare a full proposal for the SUNY Provost and, when required, begin the external evaluation process.
6. **EXPIRATION.** A PA expires one year after its publication in the *Program Review Update*. If the proposing campus does not submit a program proposal to the SUNY Provost before a PA expires, the campus must submit another PA to start the process again.

# SUNY Undergraduate Sample Program Schedule

Campus Name	SUNY Canton								
Program/Track Title and Award	HVAC A.O.S.								
Calendar Type	<table border="1"> <tr> <td>Semester</td> <td>Quarter</td> <td>Trimester</td> <td>Other</td> </tr> <tr> <td>X</td> <td></td> <td></td> <td></td> </tr> </table>	Semester	Quarter	Trimester	Other	X			
Semester	Quarter	Trimester	Other						
X									
SUNY Transfer Path Name (if one exists)	<table border="1"> <tr> <td>None</td> </tr> </table>	None							
None									

← Use Dropdown Arrow.

Use the table to show how a typical student may progress through the program. Check all columns that apply to a course or enter credits where applicable.

**KEY** Course Type: Required (R), Restricted Elective (RE), Free Elective (FE). Course Credits: Number of Credits for individual course (Enter number.) GER Area: SUNY General Education Requirement Area (Enter Area Abbreviation from the drop-down menu.) GER Credits: (Enter number of course credits.) LAS: Liberal Arts & Sciences Credits (Enter X if course is an LAS course.) Major: Major requirement (Enter X.) TPath: SUNY Transfer Path Major & Cognate Courses (Enter X.) Elective/Other: Electives or courses other than specified categories (Enter X.) Upper Div: Courses intended primarily for Juniors and seniors outside of the major (Enter X.) Upper Div Major: Courses intended primarily for Juniors and seniors within the major (Enter X.) New: new course (Enter X.) Co/Prerequisite(s): List co/prerequisite(s) for the noted courses. SUNY GER Area Abbreviations (the first five listed in order of their frequency of being required by SUNY campuses): Basic Communication (BC), Math (M), Natural Sciences (NS), Social Science (SS), Humanities (H), American History (AH), The Arts (AR), Other World Civilizations (OW), Western Civilization (WC), Foreign Language (FL).

The table will automatically update the number of credits, courses and categories in the program totals table at the bottom of the chart.

Label each term in sequence, consistent with the institution's academic calendar (e.g., Fall 1, Spring 1, Fall 2).

Term 1:

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
MATH 101/MATH 106 - Applied Math/Intermediate Algebra	3	M	3	3							
ENGL 101 - Composition & The Spoken Word	3	BC	3	3							
Forced Air Appliances	2				2					2	
Heating Lab I	5				5		5	5		5	
SOET 101 - Introduction to Computer Usage for Technicians	1				1						
Hydronic I	2				3					3	
<b>Term Totals</b>	<b>16</b>	<b>2</b>	<b>6</b>	<b>6</b>	<b>10</b>		<b>5</b>	<b>5</b>		<b>3</b>	<b>(X)</b>

Term 2:

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
HYDRONIC II -	2				3					3	
Heating Lab II	6				6		6	6		6	
Refrigeration I -	3				3					3	
Refrigeration Lab	2				2					2	
General Elective	3	3	3		3						
<b>Term Totals</b>	<b>16</b>	<b>4</b>	<b>3</b>		<b>16</b>		<b>6</b>	<b>6</b>		<b>4</b>	<b>(X)</b>

Term 3:

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
HVAC Electrical	2				2					2	
HVAC Electrical Lab	3				3					3	
HVAC Service	2				2					2	
CONS 151 - Building Trades-Blueprint Reading & Drafting	2				2						
General Elective	3		3								
Humanities	3		3								
<b>Term Totals</b>	<b>15</b>		<b>6</b>		<b>9</b>					<b>3</b>	<b>(X)</b>

Term 4:

Course Number & Title (& Type)	Number of Credits	GER Area	GE Credits	LAS	Major	Elective/Other	Upper Div	Upper Div Major	TPath	New Course	Co/Prerequisite
HVAC Controls -	3				3					3	
ACHP 105 - Refrigeration System Design	2				2						
AREA 210 - Sustainable Building	3				3						
General Elective	3	3	3								
GER course [3,4,5,or 6] or Business Elective	3	SS,AH,WC,OW	3								
<b>Term Totals</b>	<b>14</b>	<b>2</b>	<b>6</b>		<b>8</b>					<b>1</b>	<b>(X)</b>

Program Total Summary

Total Credits	SUNY GER Areas	SUNY GER Credits	Liberal Arts & Sciences Credits	Major Credits	Elective and Other Credits	Upper Division Credits	Upper Division Major Credits	Total TPath Courses	New Courses
61	2	21	6	12	12	54	11		11

GER Area Summary

Basic Communication (BC)	1	The Arts (AR)
Mathematics (M)	1	American History (AH)
Natural Sciences (NS)		Western Civilization (WC)
Social Sciences (SS)		Other World Civilizations (OW)
Humanities (H)		Foreign Language (FL)



# New Program Proposal: Undergraduate Degree Program

**Form 2A**  
Version 2017-08-28

This form should be used to seek SUNY's approval and New York State Education Department's (SED) registration of a proposed new academic program leading to an associate and/or bachelor's degree. Approval and registration are both required before a proposed program can be promoted or advertised, or can enroll students. The campus Chief Executive or Chief Academic Officer should send a signed cover letter and this completed form (unless a different form applies<sup>1</sup>), which should include appended items that may be required for Sections 1 through 6, 9 and 10 and MPA-1 of this form, to the SUNY Provost at [program.review@suny.edu](mailto:program.review@suny.edu). The completed form and appended items should be sent as a single, continuously paginated document.<sup>2</sup> If Sections 7 and 8 of this form apply, External Evaluation Reports and a single Institutional Response should also be sent, but in a separate electronic document. Guidance on academic program planning is available [here](#).

## Table of Contents

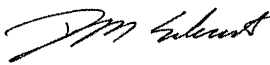
**NOTE:** Please update this Table of Contents automatically after the form has been completed. To do this, put the cursor anywhere over the Table of Contents, right click, and, on the pop-up menus, select "Update Field" and then "Update Page Numbers Only." The last item in the Table of Contents is the List of Appended and/or Accompanying Items, but the actual appended items should continue the pagination.

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<sup>1</sup>Use a **different form** if the proposed new program will lead to a graduate degree or any credit-bearing certificate; be a combination of existing registered programs (i.e. for a multi-award or multi-institution program); be a breakout of a registered track or option in an existing registered program; or **lead to certification as a classroom teacher, school or district leader, or pupil personnel services professional** (e.g., school counselor).

<sup>2</sup>This email address limits attachments to 25 MB. If a file with the proposal and appended materials exceeds that limit, it should be emailed in parts.

## Section 1. General Information

<b>a)</b> <b>Institutional Information</b>	Date of Proposal:	
	Institution's 6-digit SED Code:	261000
	Institution's Name:	SUNY College of Technology Canton
	Address:	34 Cornell Drive, Canton NY 13617
	Dept of Labor/Regent's Region:	North Country
<b>b)</b> <b>Program Locations</b>	List each campus where the entire program will be offered (with each institutional or branch campus 6-digit SED Code): 261000 SUNY College of Technology Canton	
	List the name and address of off-campus locations (i.e., extension sites or extension centers) where courses will offered, or check here [X] if not applicable:	
<b>c)</b> Proposed Program Information	Program Title:	HVAC Trades
	Award(s) (e.g., A.A., B.S.):	AOS Associates Occupational Studies
	Number of Required Credits:	Minimum [60] If tracks or options, largest minimum [    ]
	Proposed HEGIS Code:	5317
	Proposed 6-digit CIP 2010 Code:	47.0201
	If the program will be accredited, list the accrediting agency and expected date of accreditation:	
	If applicable, list the SED professional licensure title(s) <sup>3</sup> to which the program leads:	
<b>d)</b> <b>Campus Contact</b>	Name and title: Michael Newtown, P.E., Dean, Canino School of engineering Technology	
	Telephone: 315-386-7411      E-mail: newtownm@canton.edu	
<b>e)</b> <b>Chief Executive or Chief Academic Officer Approval</b>	Signature affirms that the proposal has met all applicable campus administrative and shared governance procedures for consultation, and the institution's commitment to support the proposed program. E-signatures are acceptable.	
	Name and title Douglas M. Scheidt, Ph.D., Provost and Vice President for Academic Affairs	
	Signature and Date:   5.31.18	
	If the program will be registered jointly <sup>4</sup> with one or more other institutions, provide the following information for each institution:	
	Partner institution's name and 6-digit SED Code:	
	Name, title, and signature of partner institution's CEO (or <b>append</b> a signed letter indicating approval of this proposal):	

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<sup>3</sup> If the proposed program leads to a professional license, a specialized form for the specific profession may need to accompany this proposal.

<sup>4</sup> If the partner institution is non-degree-granting, see SED's CEO Memo 94-04.



## Attestation and Assurances

On behalf of the institution, I hereby attest to the following:

That all educational activities offered as part of this proposed curriculum are aligned with the institutions' goals and objectives and meet all statutory and regulatory requirements, including but not limited to Parts 50, 52, 53 and 54 of the Rules of the Board of Regents and the following specific requirements:

That credit for study in the proposed program will be granted consistent with the requirements in §50.1(o).

That, consistent with §52.1(b)(3), a reviewing system has been devised to estimate the success of students and faculty in achieving the goals and objectives of the program, including the use of data to inform program improvements.<sup>5</sup>

That, consistent with §52.2(a), the institution possesses the financial resources necessary to accomplish its mission and the purposes of each registered program, provides classrooms and other necessary facilities and equipment as described in §52.2(a)(2) and (3), sufficient for the programs dependent on their use, and provides libraries and library resources and maintains collections sufficient to support the institution and each registered curriculum as provided in §52.2(a)(4), including for the program proposed in this application.

That, consistent with §52.2(b), the information provided in this application demonstrates that the institution is in compliance with the requirements of §52.2(b), relating to faculty.

That all curriculum and courses are offered and all credits are awarded, consistent with the requirements of §52.2(c).

That admissions decisions are made consistent with the requirements of §52.2(d)(1) and (2) of the Regulations of the Commissioner of Education.

That, consistent with §52.2(e) of the Regulations of the Commissioner of Education: overall educational policy and its implementation are the responsibility of the institution's faculty and academic officers, that the institution establishes, publishes and enforces explicit policies as required by §52.2(e)(3), that academic policies applicable to each course as required by §52.2(e)(4), including learning objectives and methods of assessing student achievement, are made explicit by the instructor at the beginning of each term; that the institution provides academic advice to students as required by §52.2(e)(5), that the institution maintains and provides student records as required by §52.2(e)(6).

That, consistent with §52.2(f)(2) of the Regulations of the Commissioner of Education, the institution provides adequate academic support services and that all educational activities offered as part of a registered curriculum meet the requirements established by state, the Rules of the Board of Regents and Part 52 of the Commissioner's regulations.

CHIEF ADMINISTRATIVE or ACADEMIC OFFICER/ PROVOST	
Signature	Date
<i>Douglas M. Scheidt</i>	5.31.18
Type or print the name and title of signatory	Phone Number
Douglas M. Scheidt, Ph.D., Provost & Vice President for Academic Affairs	315-386-7202

<sup>5</sup> The NY State Education Department reserves the right to request this data at any time and to use such data as part of its evaluation of future program registration applications submitted by the institution.

## Section 2. Program Information

### 2.1. Program Format

Check all SED-defined formats, mode and other program features that apply to the **entire program**.

- a) **Format(s):** ☒ Day ☒ Evening ☐ Weekend ☒ Evening/Weekend ☐ Not Full-Time
- b) **Modes:** ☒ Standard ☐ Independent Study ☐ External ☐ Accelerated ☐ Distance Education  
*NOTE: If the program is designed to enable students to complete 50% or more of the course requirements through distance education, check Distance Education, see Section 10, and **append** a Distance Education Format Proposal.*
- c) **Other:** ☐ Bilingual ☐ Language Other Than English ☐ Upper Division ☐ Cooperative ☐ 4.5 year ☐ 5 year

### 2.2. Related Degree Program

*NOTE: This section is not applicable to a program leading to an associate's or a bachelor's degree.*

### 2.3. Program Description, Purposes and Planning

- a) What is the description of the program as it will appear in the institution's catalog?

HVAC & R is a trade program that ensures a strong background in installation, service, and troubleshooting of heating, ventilation, air conditioning, and refrigeration in both the commercial and residential market. Students learn the theories of HVAC & R then apply these to real world equipment in a laboratory setting. Graduates will fill jobs as installers, service technicians and potentially owners of small businesses.

- b) What are the program's educational and, if appropriate, career objectives, and the program's primary student learning outcomes (SLOs)? *NOTE: SLOs are defined by the Middle States Commission on Higher Education in the Characteristics of Excellence in Higher Education (2006) as "clearly articulated written statements, expressed in observable terms, of key learning outcomes: the knowledge, skills and competencies that students are expected to exhibit upon completion of the program."*

#### **The faculty propose the following Program Educational Objectives (PEO):**

In a few years of graduations program graduates completing an Associates of Occupational Studies would be able to:

1. be engaged in the HVAC trades with a strong work ethic.
2. able to utilize the tools of the industry to service and troubleshoot HVAC equipment and systems
3. continue to learn while working as a means of staying current with the technology.
4. utilize proper skills of documentation of work performed

The **Student Learning Outcome (SLO)** of this program are as follow:

1. Identify, create, and professionally solve the technical problems using skills that are relevant to the trade of HVAC.
2. Communicate in a manner that support business practices relevant to trades.
3. Perform quality work that ensures safe and functional systems.
4. Function effectively as a member of a team engaged in activities of installation, service, and maintenance of HVAC systems.
5. Acquire and apply new knowledge as needed to stay current in the trades.

c) How does the program relate to the institution's and SUNY's mission and strategic goals and priorities? What is the program's importance to the institution, and its relationship to existing and/or projected programs and its expected impact on them? As applicable, how does the program reflect diversity and/or international perspectives? For doctoral programs, what is this program's potential to achieve national and/or international prominence and distinction?

The HVAC Associate of Occupational Studies continues the mission of serving the construction, electrical, and HVAC trades of Northern New York. Every year we have many students from the certificate programs offered by SUNY Canton continue their education into another trade certificate. To serve these students and comply with financial aid regulations, they are placed in Individual Studies to allow them to complete the second certificate with additional liberal arts courses. This new program will create a clear path for the students and provide them with advanced technical skills making them more valuable to the trade employers.

Additionally, the Excelsior Scholarship does not recognize our certificate programs. This will allow for this scholarship to become available to these students. With a large portion of our students requiring some or all their funding from scholarships. We will create them a pathway to being funded and in turn support the skilled trade workers of New York.

d) How were faculty involved in the program's design? Describe input by external partners, if any (e.g., employers and institutions offering further education)?

The faculty and the Dean of Canino School of Engineering Technology worked together in the creation of this program. The first action was to review programs at Hudson Valley Community College, and other programs of similar nature to figure out what was necessary skills they offered students. The faculty then reviewed their own certificate courses and determined what would provide additional content into a second year that would ensure better trained students. The combined certificates of Heating and Plumbing was compared to Air Conditioning Maintenance and Repair were compared to determine if the new topics are or could be added or if a new course was necessary to accomplish the Program Educational Objectives and the Student Learning Outcomes. From all this work this document took form as an announcement and now this proposal.

e) How did input, if any, from external partners (e.g., educational institutions and employers) or standards influence the program's design? If the program is designed to meet specialized accreditation or other external standards, such as the educational requirements in Commissioner's Regulations for the Profession, **append** a side-by-side chart to show how the program's components meet those external standards. If SED's Office of the Professions requires a specialized form for the profession to which the proposed program leads, **append** a completed form at the end of this document.

The PEOs, and SLOs of this program need to comply with the Institutional Student Learning Outcome (ISLO). The chart below shows a crosswalk of these objective and outcomes with the ISLOs of SUNY Canton.

The ISLOs for SUNY Canton are as follows:

1. Communication Skills
  - a. Oral
  - b. Written
2. Critical Thinking
  - a. Critical Analysis
  - b. Inquiry and Analysis
  - c. Problem Solving
3. Foundational Skills
  - a. Information Management
  - b. Quantitative Literacy & Reasoning
4. Social Responsibility
  - a. Ethical Reasoning
  - b. Global Learning

c. Intercultural Knowledge

d. Teamwork

5. Industry, Professional, Discipline-Specific Knowledge and Skills

PEO #	SLO #	ISLO #	ISLO #	ISLO #	ISLO #	ISLO #
		1. Communication Skills	2. Critical Thinking	3. Foundational Skills	4. Social Responsibility	5. Industry, Professional, Discipline-Specific Knowledge and Skills
1. be engaged in the HVAC trades with a strong work ethic.	1. Identify, create, and professionally solve the technical problems using skills that are relevant to the trade of HVAC.		c		a	
	3. Perform quality work that ensures safe and functional systems.		c		c	
	4. Function effectively as a member of a team engaged in activities of installation, service, and maintenance of HVAC systems.				d	
2. able to utilize the tools of the industry to service and troubleshoot HVAC equipment and systems	1. Identify, create, and professionally solve the technical problems using skills that are relevant to the trade of HVAC.					X
	3. Perform quality work that ensures safe and functional systems.				c	X
	4. Function effectively as a member of a team engaged in activities of installation, service, and				d	X

	maintenance of HVAC systems.					
3. continue to learn while working as a means of staying current with the technology.	5. Acquire and apply new knowledge as needed to stay current in the trades.		a, b.			
4. utilize proper skills of documentation of work performed	2. Communicate in a manner that support business practices relevant to trades.	a, b,		a		

f) Enter anticipated enrollments for Years 1 through 5 in the table below. How were they determined, and what assumptions were used? What contingencies exist if anticipated enrollments are not achieved?

Year	Anticipated Headcount Enrollment			Estimated FTE
	Full-time	Part-time	Total	
1	12	1	13	13
2	12	1	13	26
3	20	2	21	34
4	25	3	27	48
5	25	3	27	54



**g)** Outline all curricular requirements for the proposed program, including prerequisite, core, specialization (track, concentration), internship, capstone, and any other relevant component requirements, but do not list each General Education course.

[illegible]

h) Program Impact on SUNY and New York State

- h)(1) Need:** What is the need for the proposed program in terms of the clientele it will serve and the educational and/or economic needs of the area and New York State? How was need determined? Why are similar programs, if any, not meeting the need?

St. Lawrence and the two neighboring counties do not have community colleges that teach this trade of HVAC. We have served in this capacity for the many years but with the one year certificate programs. The students are the driving force for this AOS degree. Many students remain at SUNY Canton to gain additional HVAC & R knowledge and skills to make themselves more employable. We have no similar programs that are our not succeeding or failing. We simply are expanding what we are doing well to ensure more training is offered.

U.S. Department of Labor Bureau of Labor Statistics states that Heating, Air Conditioning, and Refrigeration Mechanics and Installers will have a net 3, 840 jobs or a 26.5 % increase from 2014 to 2024. SUNY Canton believes that we are the right institution to offer education for this trade. Our facilities are excellent and employers continue to seek our graduates.

- h)(2) Employment:** For programs designed to prepare graduates for immediate employment, use the table below to list potential employers of graduates that have requested establishment of the program and state their specific number of positions needed. If letters from employers support the program, they may be **appended** at the end of this form.

The potential employers are from conversations the faculty have had with these firms during the past year. There are many more smaller businesses that will also take one or two graduates.

Employer	<i>Need: Projected positions</i>	
	In initial year	In fifth year
ABC Refrigeration	2	6
Air Serve of Northern New York	1	2
Cornerstone Services	3	3
AEON Heating and Cooling	1	2

- h)(3) *Similar Programs:*** Use the table below to list similar programs at other institutions, public and independent, in the service area, region and state, as appropriate. Expand the table as needed. **NOTE:** *Detailed program-level information for SUNY institutions is available in the Academic Program Enterprise System (APES) or Academic Program Dashboards. Institutional research and information security officers at your campus should be able to help provide access to these password-protected sites. For non-SUNY programs, program titles and degree information – but no enrollment data – is available from SED's Inventory of Registered Programs.*

<b>Institution</b>	<b>Program Title</b>	<b>Degree</b>	<b>Enrollment</b>
Alfred State –Wells	Heating, Ventilation & Air Conditioning	Associates	40
Delhi	Heating, Ventilating & Air Conditioning Technology	Associates	13
Hudson Valley	Heating/Air Conditioning/Refrigeration Technical Services	Associates	124

- h)(4) *Collaboration:*** Did this program's design benefit from consultation with other SUNY campuses? If so, what was that consultation and its result?
- SUNY Canton faculty reviewed the programs of these three campuses to evaluate the course offering and then tailored the courses to this campus.
- h)(5) *Concerns or Objections:*** If concerns and/or objections were raised by other SUNY campuses, how were they resolved?

There no recorded concerns from any campus in SUNY.

- h)(6) *Undergraduate Transfer:*** The State University views as one of its highest priorities the facilitation of transfer for undergraduate students. To demonstrate adequate planning for transfer under SUNY's student mobility policy, **Section 9** of this form on **SUNY Undergraduate Transfer** must be completed for programs leading to Associate in Arts (A.A.) and Associate in Science (A.S.) and for baccalaureate programs anticipating transfer enrollment.

As an AOS degree, this program has no transfer pathways to other institutions. Another campus may wish to look at a course by course basis as a means of transfer. Students may transfer within SUNY Canton by utilizing the general electives to fulfill requirements in another major. Advise on this method of transfer will be done by advisement.

## 2.4. Admissions

- a)** What are all admission requirements for students in this program? Please note those that differ from the institution's minimum admissions requirements and explain why they differ.

1. First Year Students will meet the general admission requirements to SUNY Canton.
2. Students need to have passed Algebra Regents or equivalent in high school and be leveled at MATH 106 Intermediate Algebra

- b)** What is the process for evaluating exceptions to those requirements?

The process of evaluating exceptions is based on the admission counselor first determining that a potential student should be considered. The next person to evaluate this potential student will be the Admission Director in concert with the School Dean.

c) How will the institution encourage enrollment in this program by persons from groups historically underrepresented in the institution, discipline or occupation?

The Canino School of Engineering Technology already has several events including *Engineering Week* and *Women in Engineering* designed specifically for high school girls to encourage enrollment in STEM programs. There are many young female students who attend these events. The institution has the same issues enrolling students historically underrepresented in the institution, discipline, or occupation as any other college, but these

**The Canino School of Engineering Technology already has several events including Engineering Week Open House and Women in Engineering designed specifically for high school students to encourage enrollment in STEM programs. There are many young students who attend these events. The institution has the same issues enrolling students historically underrepresented in the institution, discipline, or occupation as any other college, but these efforts have significantly changed the odds in our recruitment.**

## **2.5. Academic and Other Support Services**

Summarize the academic advising and support services available to help students succeed in the program.

### Academic Advising and Academic Support Programs

- Academic development programs exist for specific populations. The Educational Opportunity Program (EOP) assists academically and economically disadvantaged students in reaching their goal of becoming successful college students. EOP students attend an extended orientation session prior to entering college. The EOP program provides students with financial assistance, tutoring, academic advisement, career and financial counseling and limited personal counseling. The Student Support Services TRiO Program (SSS) offers an elevated level of assistance to selected disadvantaged students. C-Step provides mentoring through academic advising, career counseling, financial counseling and professional school preparation to underrepresented minorities and economically disadvantaged students in fields such as nursing & other allied health fields, engineering and math/science. These programs provide college survival skills classes, dedicated computer labs, individual counselors and tutoring.
- Academic advising is predominantly handled by faculty advisors within the student's discipline. Students are required to meet with their advisor at least once per semester to discuss course placement and degree progress for the following semester. Faculty review student files at the end of each semester to verify that they are making Satisfactory Academic Progress. The Advising and First Year Programs office offers a supplement to the faculty advising model by providing students with information on general education and major requirements, campus processes (i.e. how to withdraw from a class), and assistance for students in transition (changing major or school). This office also provides resources and training opportunities for faculty advisors.
- SUNY Canton is committed to serving individuals with disabilities as defined by the Rehabilitation Act of 1973, Section 504, the Americans with Disabilities Act of 1990, and the ADAAA of 2008. The Accommodative (Disability) Services program is equipped to help students with mobility impairments, hearing impairments, visual impairments, learning disabilities, medical or mental health diagnoses have equal access to participate fully in college life. Students with documented disabilities may receive accommodations pursuant to their diagnosis. These may include: modified schedules, extended test times, minimal distraction area for tests, note taking services, test books in alternate format, academic counseling and advocacy. Most campus buildings are accessible; appropriate housing accommodations and accessible parking locations are available.

Academic & Support Services:

- Learning Labs for math, science and writing are available to all students free of charge on a walk-in basis. Curriculum specific labs also exist for various programs including accounting/business, computer science, and engineering. In addition, there is a general lab which offers tutoring assistance for many courses not covered by any of the specific labs. All of the labs offer face-to-face professional and peer tutor assistance. Repeatedly, students have rated SUNY Canton tutoring services with the highest satisfaction ranking among all SUNY Technology Sector campuses. Students taking classes online have access to tutoring help via email and phone. Tutoring services are designed to encourage students to become confident and independent learners by teaching skills including: note-taking, studying and test preparation skills
- Southworth Library Learning Commons supports a student population that is ever-increasing and diverse. The facility provides space for collaborative group work, quiet study and intensive tutoring – including Math & Science, Business & Accounting, Writing, and, Computer learning labs as well as a General Tutoring Lab. The Computer Lab provides space for one-on-one tutoring as well as Information Literacy instruction for classes, and is equipped with a new, state-of-the-art SMART Board. The library's collection includes approximately 50,000 print books, over 100,000 electronic books, extensive electronic databases, and a variety of digital media. The 24/7 availability of electronic books and various databases is particularly supportive of non-resident students and online courses. For resident students, the building is equipped with Wi-Fi in support of mobile computing, hundreds of desktop computer stations; and dozens of laptops are available for loan as well. Ongoing innovative technology initiatives support both the learning styles and the needs of the 21<sup>st</sup>-century learner.

The Library Learning Commons also offers a highly successful, in-demand reserve collection, including a large collection of current textbooks, many circulating iPads, headphones, calculators, microscopes, DVDs, projection and wireless keyboards and more; in addition to significant collection of anatomical models that support hands-on learning for health sciences students.

The learning commons building is now open extended hours during the academic term, Monday through Thursday from 7:30 a.m. until 2:00 a.m.; Fridays from 7:30 a.m. to 8:00 p.m.; Saturdays from 8:00 a.m. to midnight; and Sundays from 8:00 a.m. to 2:00 a.m. Professional librarians are available during most library hours to assist students with a full range of library services, and web-based synchronous and asynchronous chat reference services provide access to professional research assistance at any time, 24 hours a day, 7 days a week.

- Information Technology Services are available to every student attending the College. Several modern PC facilities, located around campus, provide all students with the opportunity for virtually unlimited use of computers seven days a week, including evenings and weekends in the library. The Help Desk is available 8:00 to 6:00 p.m. , Monday-Thursday; 8:00 to 4:30 p.m. Friday. Each student receives an email account and has full access to the internet. The residence halls have high-speed internet access provided by a local cable company. UCanWeb accounts are established for each student allowing access to grades, academic status, financial aid, pre-scheduling and other individual data.
- The Davis Health Center is an acute care center that is nationally accredited through the Accreditation Association for Ambulatory Health Care. It is staffed by a physician, nurse practitioners, and support staff and provides medical care. The Center also seeks to promote overall wellness and healthy lifestyle choices. A health educator/wellness is available to promote campus wellness initiatives on the campus working primarily with the Health and Counseling Centers. The Health Center has implemented electronic medical records and adopts HIPAA guidelines for record keeping and patient confidentiality, as well as following NYS Public Health Guidelines.
- The Personal Counseling Service provides professional counseling services for students with personal, social, and emotional concerns. Academics and Student Life both may refer students for assessments and further referrals. The fully licensed staff provides workshops, educational programs and activities contributing to overall student development. Themes include decision making, communication skills, conflict resolution, grief counseling, developing leadership skills, life-style differences, maintaining relationships, sexuality, alcohol and substance abuse, and stress management.



- The Career Services Office assists students in exploring various career opportunities, preparing high quality resumes and planning individualized job searches. The Career Services Office is instrumental in helping students find internship opportunities to meet program requirements. The Career Services web site includes the online program, Jobs4Roos, listing jobs and career opportunities for all students.

This very active office coordinates job fairs bringing on campus many employers who are interested in graduates from SUNY Canton programs.

Specialized services and dedicated areas of the Career Services website are available for LGBTQ, Handicapped, and Veteran students.

#### Special Student Services

- International students are welcomed at SUNY Canton and are growing in numbers. SUNY Canton's International Office serves incoming international students and outgoing study abroad participants. The Coordinator of International Student Initiatives helps students acclimate to campus life, processes documents, conducts new student and visiting scholar orientation, as well as plans and hosts educational, cultural, and recreational events that bring international and other SUNY Canton students together. Residence Life has a wing designed primarily for international students who are unable to travel home on the college sanctioned breaks. Students are also invited into faculty and staffs homes to share in various holidays. The Writing Center offers ESL resources as well as professional staff who can assist students in accessing these resources. Also, the dining services promote international theme nights and encourage students to come in and cook their favorite meal with them.
- Military personnel are attracted to the College's career-driven bachelors or associate degrees. The Military and Veteran's Coordinator helps veterans with benefits and the Veterans Association connects students and alumni who serve or have served in the U.S. Armed Forces.

## 2.6. Prior Learning Assessment

If this program will grant credit based on Prior Learning Assessment, describe the methods of evaluating the learning and the maximum number of credits allowed, **or check here [X ] if not applicable.**

## 2.7. Program Assessment and Improvement

Describe how this program's achievement of its objectives will be assessed, in accordance with SUNY policy, including the date of the program's initial assessment and the length (in years) of the assessment cycle. Explain plans for assessing achievement of students learning outcomes during the program and success after completion of the program. **Append** at the end of this form, a **plan or curriculum map** showing the courses in which the program's educational and, if appropriate, career objectives – from Item 2.3(b) of this form – will be taught and assessed. **NOTE:** *The University Faculty Senate's Guide for the Evaluation of Undergraduate Programs is a helpful reference.*

The Table Canton 1 shows the mapping of the SLOs to courses as to the levels of assessment showing where these SLOs will be assessed. If necessary to investigate introductory and reinforcing SLOs are mapped so corrective changes happen as early as possible in the program.

SLO #	Courses														
	HVAC 101	HVAC 102	HVAC 103	HVAC 104	HVAC 105	HVAC 106	HVAC 110	HVAC 201	HVAC 202	HVAC 203	HVAC 204	HVAC 205	ACHP 105	CONS 151	AREA 210
1. Identify, create, and professionally solve the technical problems using skills that are relevant to the trade of HVAC.	I		I		R	R	R	R		E		E	R	I	
2. Communicate in a manner that support business practices relevant to trades.				I		R			R		E	E	R		
3. Perform quality work that ensures safe and functional systems.		I		I	R	R					E	E			R
4. Function effectively as a member of a team engaged in activities of installation, service, and maintenance of HVAC systems.		I	I			R			R		E	E	R		

5. Acquire and apply new knowledge as needed to stay current in the trades.							I	R		E	E	E		I	R
---	--	--	--	--	--	--	---	---	--	---	---	---	--	---	---

I	Introduce
R	Re-inforce
E	Evaluate

Table 1 Canton 1- SLO Course Mapping

**Section 3. Program Schedule and Curriculum**

Complete the **SUNY Undergraduate Program Schedule** to show how a typical student may progress through the program. This is the registered curriculum, so please be precise. Enter required courses where applicable, and enter generic course types for electives or options. Either complete the blank Schedule that appears in this section, or complete an Excel equivalent that computes all sums for you, and can be found [here](#). Rows for terms that are not required can be deleted.

- NOTES:** *The Undergraduate Schedule must show all curricular requirements and demonstrate that the program conforms to SUNY’s and SED’s policies.*
- It must show how a student can complete all program requirements within SUNY credit limits, unless a longer period is selected as a format in Item 2.1(c): two years of full-time study (or the equivalent) and 64 credits for an associate degree, or four years of full-time study (or the equivalent) and 126 credits for a bachelor’s degree. Bachelor’s degree programs should have at least 45 credits of upper division study, with 24 in the major.*
  - It must show how students in A.A., A.S. and bachelor’s programs can complete, within the first two years of full-time study (or 60 credits), no fewer than 30 credits in approved SUNY GER courses in the categories of Basic Communication and Mathematics, and in at least 5 of the following 8 categories: Natural Science, Social Science, American History, Western Civilization, Other World Civilizations, Humanities, the Arts and Foreign Languages*
  - It must show how students can complete Liberal Arts and Sciences (LAS) credits appropriate for the degree.*
  - When a SUNY Transfer Path applies to the program, it must show how students can complete the number of SUNY Transfer Path courses shown in the Transfer Path Requirement Summary within the first two years of full-time study (or 60 credits), consistent with SUNY’s Student Seamless Transfer policy and MTP 2013-03.*
  - Requests for a program-level waiver of SUNY credit limits, SUNY GER and/or a SUNY Transfer Path require the campus to submit a Waiver Request –with compelling justification(s).*

EXAMPLE FOR ONE TERM: Undergraduate Program Schedule

Term 2: Fall 20xx	Credits per classification						
Course Number & Title	Cr	GER	LAS	Maj	TPath	New	Prerequisite(s)
ACC 101 Principles of Accounting	4			4	4		
MAT 111 College Mathematics	3	M	3	3			MAT 110
CMP 101 Introduction to Computers	3						
HUM 110 Speech	3	BC	3			X	
ENG 113 English 102	3	BC	3				
Term credit total:	16	6	9	7	4		

- Special Cases for the Program Schedules:**
- For a program with multiple tracks or with multiple schedule options (such as full-time and part-time options), use one Program Schedule for each track or schedule option. Note that licensure qualifying and non-licensure qualifying options cannot be tracks; they must be separate programs.*

- *When this form is used for a multi-award and/or multi-institution program that is not based entirely on existing programs, use the schedule to show how a sample student can complete the proposed program. **NOTE:** Form 3A, Changes to an Existing Program, should be used for new multi-award and/or multi-institution programs that are based entirely on existing programs.*
- *SUNY policy governs the awarding of two degrees at the same level.*
- *Minors require neither SUNY approval nor SED registration.*

**a)** If the program will be offered through a nontraditional schedule (i.e., not on a semester calendar), what is the schedule and how does it impact financial aid eligibility? **NOTE:** Consult with your campus financial aid administrator for information about nontraditional schedules and financial aid eligibility.

**b)** For **each existing course** that is part of the proposed undergraduate major (including cognates and restricted electives, but not including general education), **append a catalog description** at the end of this document.

c) For **each new course** in the undergraduate program, **append a syllabus** at the end of this document. **NOTE:** Syllabi for all courses should be available upon request. Each syllabus should show that all work for credit is college level and of the appropriate rigor. Syllabi generally include a course description, prerequisites and corequisites, the number of lecture and/or other contact hours per week, credits allocated (consistent with SUNY policy on credit/contact hours), general course requirements, and expected student learning outcomes.

d) If the program requires external instruction, such as clinical or field experience, agency placement, an internship, fieldwork, or cooperative education, **append** a completed External Instruction form at the end of this document.

**NOTE:** The University Faculty Senate's *Internships and Co-ops, A Guide for Planning, Implementation and Assessment* is a helpful reference: <http://www.system.suny.edu/media/suny/content-assets/documents/faculty-senate/Internship-Guide--update-10.19.16.pdf>



**SUNY Undergraduate Program Schedule (OPTION: You can paste an Excel version of this schedule AFTER this line, and delete the rest of this page.)**

**Program/Track Title and Award: HVAC Trades A.O.S.**

- Indicate **academic calendar type**: [ X ] Semester [ ] Quarter [ ] Trimester [ ] Other (describe):
- **Label each term in sequence**, consistent with the institution's academic calendar (e.g., Fall 1, Spring 1, Fall 2)
- **Name of SUNY Transfer Path**, if one exists: NONE **See Transfer Path Requirement Summary for details**
- Use the table to show **how a typical student may progress through the program**; copy/expand the table as needed. **Complete all columns that apply to a course.**

Term 1: Fall 1		See KEY.						
Course Number & Title	Cr	GER	LAS	Maj	TP	New	Co/Prerequisites	
Math 106 – Intermediate Algebra	3	M	3					
ENGL 101 – Composition & the Spoken Word	3	BC	3					
HVAC 103 Heating Systems I	3			3		3		
HVAC 104 Heating Lab I	2			2		2	Pre-or Co-requisite HVAC 103	
SOET 101 – Intro to Computer Usage for Technician	1							
CONS 151 Building Trades – Blueprint Reading & Drafting	2			2				
Term Credit Totals:	14	6	6	7		5		
Term 3: Fall 2		See KEY.						
Course Number & Title	Cr	GER	LAS	Maj	TP	New	Co/Prerequisites	
HVAC 201 HVAC Electrical and Motor Control	2			2		2	HVAC 105	
HVAC 202 HVAC Electrical Motor Controls Lab	2			3		3	HVAC 201	
HVAC 205 HVAC Service, Troubleshooting & Repair	3			2		2	Pre-CONS 151 & HVAC 105 Pre-or Co-req HVAC 201	
CITA 108 Spreadsheets	1							
General Elective	3							
Humanities	3	H	3					

Term 2: Spring 1		See KEY.						
Course Number & Title	Cr	GER	LAS	Maj	TP	New	Co/Prerequisites	
HVAC 105 Heating Systems II	3			3		3	HVAC 103 & 104	
HVAC 106 Residential & Light Commercial Installation	2			2		2	Pre-requisite CONS 151 pre-or co-requisite HVAC 105	
HVAC 101 Refrigeration I	2			2		2		
HVAC 102 Refrigeration Lab	3			3		3	Pre-or co-requisite HVAC 101	
HVAC 110 Plumbing	3			3		3		
Liberal Arts and Sciences	3		3					
Total Credit Totals	16		3	13		13		
Term 4: Spring 2		See KEY.						
Course Number & Title	Cr	GER	LAS	Maj	TP	New	Co/Prerequisites	
HVAC 203 Commercial Refrigeration	2			2		2	HVAC 101 & 102	
HVAC 204 Commercial Refrigeration Lab	3			3		3	HVAC 203	
ACHP 105 Refrigeration SYSTEM Design	2			2		2		
AREA 210 Sustainable Building	3			3		3		
General Elective	3							
General Education Requirement	3	SS	3					

Total Credit Totals:	14	3	3	7		7		Total Credit Totals	16	3	3	10		10	
----------------------	----	---	---	---	--	---	--	---------------------	----	---	---	----	--	----	--

Program Totals (in credits):	Total	SUNY	LAS:	Major:	Elective & Other:	Upper	Upper Division	Number of SUNY GER Categories:
	Credits: 60	GER: 12	15	37	6	Division:	Major:	
								4

**KEY** Cr: credits **GER:** SUNY General Education Requirement (Enter Category Abbreviation) **LAS:** Liberal Arts & Sciences (Enter credits) **Maj:** Major requirement (Enter credits) **TP:** SUNY Transfer Path Courses (Enter credits) **New:** new course (Enter X) **Co/Prerequisite(s):** list co/prerequisite(s) for the noted courses **Upper Division:** Courses intended primarily for juniors and seniors **SUNY GER Category Abbreviations** (the first five listed in order of their frequency of being required by SUNY campuses): Basic Communication (BC), Math (M), Natural Sciences (NS), Social Science (SS), Humanities (H), American History (AH), The Arts (AR), Other World Civilizations (OW), Western Civilization (WC), Foreign Language (FL).

(Enter credits) **New:** new course (Enter X) **Co/Prerequisite(s):** list co/prerequisite(s) for the noted courses **Upper Division:** Courses intended primarily for juniors and seniors **SUNY GER Category**

**Abbreviations:** American History (AH), Basic Communication (BC), Foreign Language (FL), Humanities (H), Math (M), Natural Sciences (NS), Other World Civilizations (OW), Social Science (SS), The Arts (AR), Western Civilization (WC)

#### Section 4. Faculty

a) Complete the **SUNY Faculty Table** on the next page to describe current faculty and to-be-hired (TBH) faculty.

b) **Append** at the end of this document position descriptions or announcements for each to-be-hired faculty member.

***NOTE:** CVs for all faculty should be available upon request. Faculty CVs should include rank and employment status, educational and employment background, professional affiliations and activities, important awards and recognition, publications (noting refereed journal articles), and brief descriptions of research and other externally funded projects. New York State's requirements for faculty qualifications are in Regulation 52.2 <http://www.highered.nysed.gov/ocue/lrp/rules.htm>.*

c) What is the institution's definition of "full-time" faculty?

At SUNY Canton a full-time is someone who is teaching a 12-credit hour load or 16 contact hours per semester. The designation is given to Lecturer, Instructors, Assistant Professor, Associate Professor, or Professor.

### SUNY Faculty Table

Provide information on current and prospective faculty members (identifying those at off-campus locations) who will be expected to teach any course in the major. Expand the table as needed. Use a separate Faculty Table for each institution if the program is a multi-institution program.

(a)	(b)	(c)	(d)	(e)	(f)
Faculty Member Name and Title/Rank (Include and identify Program Director with an asterisk.)	% of Time Dedicated to This Program	Program Courses Which May Be Taught (Number and Title)	Highest and Other Applicable Earned Degrees (include College or University)	Discipline(s) of Highest and Other Applicable Earned Degrees	Additional Qualifications: List related certifications, licenses and professional experience in field.
<b>PART 1. Full-Time Faculty</b>					
Stanley Skowronek *	100	HVAC 101, 102, 201, 202, 205, 204, ACHP 105	B.S., Rochester Institute of Technology,	Mechanical Engineering	Certificate, Air Conditioning Maintenance & Repair, SUNY Canton; 28 years of mechanical engineering for General Motors
Cullen Haskins	10	AREA 210	M.S. & B.S. Clarkson University	Mechanical Engineering,	
<b>Part 2. Part-Time Faculty</b>					
<b>Part 3. Faculty To-Be-Hired (List as TBH1, TBH2, etc., and provide title/rank and expected hiring date.)</b>					
TBH 1	100	HVAC 103, 104, 105, 106, 110, 205, CONS 151,	Bachelor required, Masters preferred.	Mechanical Engineering or related field	Experience in trades

## Section 5. Financial Resources and Instructional Facilities

- a) What is the resource plan for ensuring the success of the proposed program over time? Summarize the instructional facilities and equipment committed to ensure the success of the program. Please explain new and/or reallocated resources over the first five years for operations, including faculty and other personnel, the library, equipment, laboratories, and supplies. Also include resources for capital projects and other expenses.

The resources for this new program exist in our current two certificate programs, and simple improvements in updating the equipment will be sought from campus funding. The lab facilities of the two certificate programs consist of heating, cooling, and refrigeration appliances, test and service equipment to allow for the proper training of these AOS students. The campus has between the two existing certificate programs twenty-five hundred square feet of floor space. Space is ample to conduct the types of classes proposed in this degree.

- b) Complete the five-year SUNY Program Expenses Table, below, consistent with the resource plan summary. Enter the anticipated academic years in the top row of this table. List all resources that will be engaged specifically as a result of the proposed program (e.g., a new faculty position or additional library resources). If they represent a continuing cost, new resources for a given year should be included in the subsequent year(s), with adjustments for inflation or negotiated compensation. Include explanatory notes as needed.



SUNY Program Expenses Table

(OPTION: You can paste an Excel version of this schedule AFTER this sentence, and delete the table below.)

SUNY Program Expenses Table

SUNY Program Expenses Table

Program Expense Categories	Expenses (in dollars)					
	Before Start	Academic Year 1:	Academic Year 2:	Academic Year 3:	Academic Year 4:	Academic Year 5:
YEAR (example 2013)		2019-2020	2020-2021	2021-2022	2022-2023	2023-2024
(a) Personnel (including faculty and all others)	\$0	\$144,729	\$147,623	\$150,576	\$150,576	\$150,576
(b) Library						
(c) Equipment		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
(d) Laboratories						
(e) Supplies		\$2,400	\$2,400	\$2,400	\$2,400	\$2,400
(f) Capital Expenses						
(g) Other (Specify):						
(h) Sum of Rows Above	\$0	\$148,129	\$151,023	\$153,976	\$153,976	\$153,976

**Explanatory notes:** The exisiting faculty and TBH1 with benefits should be Academic Year 1 salary then following years estimates a 2% increase. Equipment is provided at \$1000 for purchase of any additional test and service equipment if enrollment projections grow. Supplies are based on the existing certificate programs current supply budgets.

## Section 6. Library Resources

- a) Summarize the analysis of library collection resources and needs *for this program* by the collection librarian and program faculty. Include an assessment of existing library resources and accessibility to those resources for students enrolled in the program in all formats, including the institution's implementation of SUNY Connect, the SUNY-wide electronic library program.

Southworth Library is located in the geographic center of the campus. Its services and resources are available on three levels, with the reference collection, reserve materials, a computer lab, offices, tutoring support services including the Writing Center, and the Information Services Help Desk on the first floor. The second level houses the book stacks, individual study carrels, group study and media-viewing rooms, and current and back-issue journals and periodicals.

The library supports a student population characterized by continual growth and diversity. The facility provides space for group discussion, quiet study and intensive tutoring, including math and accounting, writing, and computer tutoring labs. The computer lab provides space for one-on-one tutoring as well as information literacy instruction for classes. The library's collection includes approximately 50,000 print and 80,000 electronic books, extensive electronic databases, and a variety of digital media. Additionally, the college has access to all books within the SUNY system available via interlibrary loan, and SUNY Canton students, faculty and staff have borrowing privileges at all of the Associated Colleges libraries, including Clarkson, St. Lawrence University and SUNY Potsdam.

The 24/7 availability of electronic books and various databases is particularly supportive of non-resident students and online courses. For resident students, the building is equipped with wi-fi in support of mobile computing, and laptops, iPads, Kindle reading devices and other emerging technologies are available for loan as well. Ongoing innovative technology initiatives support both the learning styles and the needs of the 21st-century learner. The library also offers a highly successful, in-demand reserve textbook collection, as well as a large number of anatomical models that support hands-on learning for students in the sciences and health programs.

Professional librarians are available during library hours to assist students with a full range of library services, and a web-based chat reference service provides access to professional research assistance at any time, 24 hours a day, 7 days a week.

In response to student need, the library has extended its hours of operation and is currently open 120.5 hours a week during the regular academic term. The library will also be maintaining 24-hour/7-day accessibility for the midterm and final examination weeks.

### Analysis

The library is a well-organized, responsive, user-friendly learning resource for this campus. In the most recent academic year, over 1,000 students received a formal information literacy classroom session from a librarian about the utilization of the facility and the types of materials available. The library reserve program allows the faculty to make unique books or other materials, including classroom textbooks and anatomical models, available to the students for curricular support or enhancement of lecture topics. The library makes available

many of the textbooks for the GER or first-year required courses in the Heating, Ventilation, and Air Conditioning and Refrigeration programs.

The librarians have identified numerous titles that specifically support Heating, Ventilation, and Air Conditioning and Refrigeration education including books, periodicals, audiovisual material, and thousands more that support the multi-disciplinary nature of Heating, Ventilation, and Air Conditioning and Refrigeration, including design, policy, and construction. A listing of the library holdings specific Heating, Ventilation, and Air Conditioning and Refrigeration is available (attached). The library has initiated a Library Liaison Program through which a professional librarian is assigned to assist specific departments in collecting materials for the library collection; a librarian is actively pursuing adding HVAC and other related resources to the collection. The library also subscribes to many online, searchable Research Databases supportive of the Heating, Ventilation, and Air Conditioning and Refrigeration programs, including: Applied Science & Technology Full-text, Computers & Applied Sciences Complete, and Vocational and Career Collection. These databases provide full-text access to thousands of articles, reviews, media, and other electronic resources.

### **Projection**

The library capabilities are likely to remain advanced beyond the current demands of the HVAC AOS program on this campus. A liaison librarian is assigned to each department, and consults with faculty to solicit collection development and collection management suggestions. The library subscribes to online databases, utilizes DVD and streaming-video technology, offers 24/7 availability of electronic books, and participates in a robust interlibrary loan program which provides both physical book and electronic document delivery services for faculty and students. The library is actively investigating additional print and electronic resources and further subscription databases that will support the research and information needs of the Sports Management program.

### **Library and information resources, services and support at a distance:**

To support online learners at SUNY Canton, we provide reasonable and comparable administrative, academic, and support services to distance students.

Resources and services are available online through the [www.canton.edu](http://www.canton.edu) website. The web site allows students to access program information and directly chat with or email support departments. The following are specific examples of these reasonable and comparable services:

- Academic and support services offer a substantial number of writing tutorials online as well as provide individual assistance online via the Writing Center.
- Math worksheets, resources, and tutoring are available online via the Math Tutoring Center. Additionally, tutorials, resources, and some tutoring are available online via the Science Tutoring Center.
- Accommodative Services has adapted its policies to address the needs of distance students.
- The Library offers a wide range of electronic resources for use by faculty and online students. These include electronic access to the library catalog, full-text databases, reference resources and online tutorials related

to information and literary skills. Students also have access to librarians via phone, email, sms texting, online chat and asynchronous electronic reference.

Contact information for all the areas in academic and support services is clearly and consistently presented to all students via SUNY Canton's web pages.

### Electronic Journal Titles

2007 ASHRAE Handbook - Heating, Ventilating, and Air-Conditioning Applications (I-P Edition)
ASHRAE Handbook: Heating, Ventilating & Air-Conditioning Systems & Equipment (2008)
ASHRAE Handbook: HVAC Applications
ASHRAE Journal
ASHRAE Transactions
Control and Instrumentation Technology in HVAC: PCs and Environmental Control
DeWALT® HVAC Code Reference
Efficient HVAC Systems Deskbook
Engineered Systems
HVAC Control in the New Millennium
HVAC Controls: Operation & Maintenance
HVAC Fundamentals
HVAC Fundamentals
HVAC Procedures and Forms Manual
HVAC&R Research
Proceedings of the 8th International Symposium on Heating, Ventilation and Air Conditioning (HVAC & R Component and Energy System)
Tecumseh Products Company SWOT Analysis
Testing & Balancing HVAC Air and Water Systems, Fifth Ed.
Testing and Balancing HVAC Air and Water Systems
Testing and Balancing HVAC Air and Water Systems (4th Edition)
United States Heating & AC Equipment Wholesales Industry Report
United States Plumbing & Heating & A/C Contractors Industry Report
United States Plumbing & Heating & AC Contractors Industry Jobs & Wages Report
United States Steam & Air-Conditioning Supply Industry Report
Watsco, Inc SWOT Analysis
Worldwide Plumbing & Heating & A/C Contractors Industry Report

### Book Titles

Advanced Solutions in Power Systems : HVDC, FACTS, and AI Techniques.
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Advanced Solutions in Power Systems [electronic resource] : HVDC, FACTS, and Artificial Intelligence.
Antibody-Drug Conjugates : Fundamentals, Drug Development, and Clinical Outcomes to Target Cancer.
Architectural Acoustics Illustrated.
Building energy management systems : applications to low energy HVAC and natural ventilation control / G.J. Levermore.
Cable System Transients : Theory, Modeling and Simulation.
Cable System Transients [electronic resource] : Theory, Modeling and Simulation.
CISSP For Dummies.
Control and instrumentation technology in HVAC : PCs and environmental control / by Michael F. Hordeski.
Direct digital control for building HVAC systems / Michael J. Coffin.
Fundamentals of Integrated Design for Sustainable Building [electronic resource].
High Voltage Direct Current Transmission : Converters, Systems and DC Grids.
High Voltage Direct Current Transmission [electronic resource] : Converters, Systems and DC Grids.
HVAC control in the new millennium / by Michael F. Hordeski.
HVAC controls and systems / John I. Levenhagen, Donald H. Spethmann.
HVAC duct construction standards : metal and flexible / Sheet Metal and Air Conditioning Contractors' National Association, Inc.
HVAC mechanic : start and run a money-making business / R. Dodge Woodson.
HVAC systems and components handbook / [edited by] Nils R. Grimm, Robert C. Rosaler.
HVDC Grids [electronic resource] : For Offshore and Supergrid of the Future.
Mastering Autodesk Revit MEP 2016 : Autodesk Official Press.
Mastering Autodesk Revit MEP 2016 [electronic resource] : Autodesk Official Press.
Optimizing HVAC systems / [compiled by] Albert Thumann.
Quick & basic electricity : a contractor's easy guide to HVAC circuits, controls, and wiring diagrams / Carol Fey.
Quick & basic troubleshooting : a contractor's easy guide to HVAC wiring & circuits / Carol Fey.
Space Planning Basics [electronic resource].
Testing and balancing HVAC air and water systems / Samuel C. Monger.

- b) Describe the institution's response to identified collection needs and its plan for library development.

At this time no additional materials are believed to be necessary for the collection. As faculty identify materials these will be submitted and acquired through normal budgeting processes.

## Section 7. External Evaluation

SUNY requires external evaluation of all proposed bachelor's degree programs, and may request an evaluation for a proposed associate degree or certificate program in a new or emerging field or for other reasons.

Is an external evaluation required? [ X ] No [ ] Yes

If yes, list below all SUNY-approved evaluators who conducted evaluations (adding rows as needed), and **append at the end of this document** each original, signed External Evaluation Report. **NOTE:** To select external evaluators, a campus sends 3-5 proposed evaluators' names, titles and CVs to the assigned SUNY Program Reviewer, expresses its preferences and requests approval.

<u>Evaluator #1</u>	<u>Evaluator #2</u>
Name:	Name:
Title:	Title:
Institution:	Institution:

## Section 8. Institutional Response to External Evaluator Reports

As applicable, **append** at the end of this document a single *Institutional Response* to all *External Evaluation Reports*.

## Section 9. SUNY Undergraduate Transfer

The State University views as one of its highest priorities the facilitation of transfer.

- a) For a **proposed Associate in Arts (A.A.) or an Associate in Science (A.S.) degree**, demonstrate that the program's graduates will be able to transfer into at least two parallel SUNY baccalaureate programs and complete them within two additional years of full-time study, per SUNY policy, by listing the transfer institutions below and **appending** at the end of this document:
- two completed SUNY Transfer Course Equivalency Tables, one for each transfer institution; and
  - a letter from the Chief Academic Officer of each transfer institution asserting acceptance of the completed Transfer Course Equivalency Table.

Program proposals must include two articulation agreements with parallel programs. Every effort should be made to obtain two SUNY articulation agreements for this requirement. In the event that such articulations are not possible, campuses are encouraged to work with their campus reviewer to find appropriate alternatives.

Baccalaureate Degree Institution	Baccalaureate Program SED Code and Title	Degree

- b) For a **proposed baccalaureate program**, document articulation with at least two parallel SUNY associate degree programs for seamless transfer, by **appending documentation of articulation**, such as SUNY Transfer Course Equivalency Tables and/or letters of support from Chief Academic Officers at associate degree institutions or their designees. **If transfer does not apply to this program, please explain why.**

Associate Degree Institution	Associate Program SED Code and Title	Degree

**NOTE:** Transfer course equivalency tables are needed, despite SUNY Transfer Paths, to ensure that all courses in an A.A. or A.S. program will be accepted for transfer. Official SED program titles and codes can be found on NYSED's Inventory of Registered Programs [here](#).

#### **Section 10. Application for Distance Education**

- a) Does the program's design enable students to complete 50% or more of the course requirements through distance education? ☐ No ☐ Yes. If yes, **append** a completed *SUNY Distance Education Format Proposal* at the end of this proposal to apply for the program to be registered for the distance education format.
- b) Does the program's design enable students to complete 100% of the course requirements through distance education? ☐ No ☐ Yes

#### **Section MPA-1. Need for Master Plan Amendment and/or Degree Authorization**

- a) Based on guidance on Master Plan Amendments, please indicate if this proposal requires a Master Plan Amendment.  
☐ No ☐ Yes, a completed *Master Plan Amendment Form* is **appended** at the end of this proposal.
- b) Based on *SUNY Guidance on Degree Authorizations* (below), please indicate if this proposal requires degree authorization.  
☐ No ☐ Yes, once the program is approved by the SUNY Provost, the campus will work with its Campus Reviewer to draft a resolution that the SUNY Chancellor will recommend to the SUNY Board of Trustees.

***SUNY Guidance on Degree Authorization.*** Degree authorization is required when a proposed program will lead to a new degree (e.g., B.F.A., M.P.H.) at an existing level of study (i.e., associate, baccalaureate, first-professional, master's, and doctoral) in an existing disciplinary area at an institution. Disciplinary areas are defined by the New York State Taxonomy of Academic Programs. Degree authorization requires approval by the SUNY Provost, the SUNY Board of Trustees and the Board of Regents.



### List of Appended and/or Accompanying Items

- a) **Appended Items:** If materials required in selected items in Sections 1 through 4 and Sections 9, 10 and MPA-1 of this form apply to this proposal, they should be appended as part of this document, after this page, with continued pagination. In the first column of the chart below, please number the appended items, and append them in number order.

Number	Appended Items	Reference Items
	<i>For multi-institution programs</i> , a letter of approval from partner institution(s)	Section 1, Item (e)
	<i>For programs leading to professional licensure</i> , a side-by-side chart showing how the program's components meet the requirements of specialized accreditation, <u>Commissioner's Regulations for the Profession</u> , or other applicable external standards	Section 2.3, Item (e)
	<i>For programs leading to licensure in selected professions for which the SED Office of Professions (OP) requires a specialized form</i> , a completed version of that form	Section 2.3, Item (e)
	<i>OPTIONAL: For programs leading directly to employment</i> , letters of support from employers, if available	Section 2, Item 2.3 (h)(2)
1	<i>For all programs</i> , a plan or curriculum map showing the courses in which the program's educational and (if appropriate) career objectives will be taught and assessed	Section 2, Item 7
2	<i>For all programs</i> , a catalog description for each existing course that is part of the proposed undergraduate major (including cognates and restricted electives)	Section 3, Item (b)
3	<i>For all programs with new courses in the major</i> , syllabi for all new courses in a proposed undergraduate major	Section 3, Item (c)
	<i>For programs requiring external instruction</i> , a completed <u>External Instruction Form</u> and documentation required on that form	Section 3, Item (d)
	<i>For programs that will depend on new faculty</i> , position descriptions or announcements for faculty to-be-hired	Section 4, Item (b)
	<i>For all A.A. and A.S. programs</i> , Transfer Equivalency Tables and letters of support from at least two SUNY baccalaureate institutions; <i>for baccalaureate programs that anticipate transfer student enrollment</i> , documentation of seamless transfer with at least two SUNY two-year programs	Section 9
	<i>For programs designed to enable students to complete at least 50% of the course requirements at a distance</i> , a <u>Distance Education Format Proposal</u>	Section 10
	<i>For programs requiring an MPA</i> , a <u>Master Plan Amendment Form</u>	Section MPA-1

- b) **Accompanying Items - External Evaluations and Institutional Response:** If Sections 7 and 8 of this form indicate that external evaluation is required as part of this proposal, please send a separate electronic document to [program.review@suny.edu](mailto:program.review@suny.edu) that contains the original, signed *External Evaluation Reports* and a single *Institutional Response* to all reports. The file name should indicate the campus, program title, award and content of the file (e.g., BuffaloU-English-PhD-ExEval).

## Appendix 1- Curriculum Map and SLOs

### Program Educational Objectives, Student Learning Outcomes, mapped to Institutional Learning Outcomes.

PEO #	SLO #	ISLO # 1. Communication Skills	ISLO # 2. Critical Thinking	ISLO # 3. Foundational Skills	ISLO # 4. Social Responsibility	ISLO # 5. Industry, Professional, Discipline-Specific Knowledge and Skills
1. be engaged in the HVAC trades with a strong work ethic.	1. Identify, create, and professionally solve the technical problems using skills that are relevant to the trade of HVAC.		c		a	
	3. Perform quality work that ensures safe and functional systems.		c		c	
	4. Function effectively as a member of a team engaged in activities of installation, service, and maintenance of HVAC systems.				d	
2. able to utilize the tools of the industry to service and troubleshoot HVAC equipment and systems	1. Identify, create, and professionally solve the technical problems using skills that are relevant to the trade of HVAC.					x
	3. Perform quality work that ensures safe and functional systems.				c	x
	4. Function effectively as a member of a team engaged in activities of installation, service, and maintenance of HVAC systems.				d	x
3. continue to learn while working as a means of staying current with the technology.	5. Acquire and apply new knowledge as needed to stay current in the trades.		a, b.			
4. utilize proper skills of documentation of work performed	2. Communicate in a manner that support business practices relevant to trades.	a, b.		a		

# Curriculum Map for Assessment

SLO #	Courses														
	HVAC 101	HVAC 102	HVAC 103	HVAC 104	HVAC 105	HVAC 106	HVAC 110	HVAC 201	HVAC 202	HVAC 203	HVAC 204	HVAC 205	ACHP 105	CONS 151	AREA 210
1. Identify, create, and professionally solve the technical problems using skills that are relevant to the trade of HVAC.	I		I		R	R	R	R		E		E	R	I	
2. Communicate in a manner that support business practices relevant to trades.				I		R			R		E	E	R		
3. Perform quality work that ensures safe and functional systems.		I		I	R	R					E	E			R
4. Function effectively as a member of a team engaged in activities of installation, service, and maintenance of HVAC systems.		I	I			R			R		E	E	R		
5. Acquire and apply new knowledge as needed to stay current in the trades.							I	R		E	E	E		I	R

I	Introduce
R	Re-inforce
E	Evaluate

# Program Advising Sheet

SUNY Canton HVAC A.O.S.			Fall 2019	
Program Coordinator:				
1 <sup>st</sup> Semester		Credit	Term	Grade
MATH 106	Intermediate Algebra	3		
ENGL 101	Composition & the Spoken Work (GER 10)	3		
HVAC 103	Heating Systems I	3		
HVAC 104	Heating Lab I	2		
SOET 101	Intro to Computer Usage	1		
CONS 151	Building Trades – Blueprint Reading & Drafting	2		
		14		
2 <sup>nd</sup> Semester				
HVAC 105	Heating Systems II	3		
HVAC 106	Residential & Light Commercial Installation	2		
HVAC 101	Refrigeration I	2		
HVAC 102	Refrigeration Lab	3		
HVAC 110	Plumbing	3		
	LAS	3		
		16		
3 <sup>rd</sup> Semester				
HVAC 201	HVAC Electrical and Motor Control	2		
HVAC 202	HVAC Electrical Motor Controls Lab	2		
HVAC 205	HVAC Service, Troubleshooting & Repair	3		
CITA 108	Spreadsheets	1		
	GER Elective	3		
	Humanities	3		
		14		
4 <sup>th</sup> Semester				
HVAC 203	Commercial Refrigeration	2		
HVAC 204	Commercial Refrigeration Lab II	3		
ACHP 105	Refrigeration SYSTEM Design	2		
AREA 210	Sustainable Building	3		
	GER Elective	3		
	GER Elective (GER 3)	3		
		16		

## NOTES:

- Mathematics level depends on previous preparation. Applied College Mathematics (MATH 101) is the minimum requirement. Math 106 Intermediatly **Graduation Requirements: Total Semester Credit Hours – G.P.A. 2.0 min.**

STUDENT \_\_\_\_\_ CERTIFIED FOR GRADUATION YES NO

SSN \_\_\_\_\_ CERTIFIED BY \_\_\_\_\_

CLASS OF \_\_\_\_\_ G.P.A. 1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_ TOTAL G.P.A. \_\_\_\_\_



## Appendix 2 - Course Descriptions of Existing Courses

### MATH 106

This course reviews and builds on the basic, fundamental concepts of algebra, which are required in many other courses and areas of study. Topics include: a review of fundamental concepts, first degree equations and inequalities, graphing and systems of equations, products and factoring, rational expressions, exponents and radicals, quadratic equations.

### ENGL 101

This course is designed to help students communicate effectively orally and in writing. Students develop critical thinking skills, rhetorical knowledge, basic research skills, knowledge of conventions, and communication ethics.

### SOET 101

This course introduces students to the Windows operating environment including creating and manipulating files and folders. Topics pertaining to word processor, spreadsheet and presentation software are introduced with laboratory assignments and instruction.

### CONS 151

Instruction includes understanding the fundamental concepts in freehand sketching and instrument drawing needed for communication in the construction industry. Orthographic projection, pictorials and perspective drawing techniques will be introduced. A variety of drawings will be studied in order to become familiar with information contained on them and how they are interpreted. CERTIFICATE/AAS ELECTIVE CREDIT ONLY. One hour lecture, two hours laboratory per week.

### CITA 108

A course designed to introduce the student to the fundamentals of spreadsheets using Microsoft® Excel as the instructional platform. Students will create worksheets with literal and numeric data. The numeric data will be constants and/or formulas. Students will also learn and use the relative and absolute cell reference system in formulas. Printing of spreadsheets creating line, bar, and pie graphs will also be included.

### ACHP 105

The refrigeration system and its component parts are studied in detail. Components are sized and selected to meet application requirements and then system equilibrium is determined.

### AREA 210

This course is an introduction to building science. Basic topics are introduced such as air leakage, heating, cooling, and insulation. Students will also see different types of building construction and how they relate to building science.

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



**PRELIMINARY COURSE OUTLINE**

**HVAC101– Refrigeration I**

**Prepared By: Stan Skowronek**

**CANINO SCHOOL OF ENGINEERING TECHNOLOGY**



**MECHANICAL & ENERGY TECHNOLOGIES**  
**September 2017**

- A. **TITLE:** Refrigeration I
- B. **COURSE NUMBER:** HVAC101
- C. **CREDIT HOURS:** 2
- D. **WRITING INTENSIVE COURSE:** No
- E. **COURSE LENGTH:** (15 weeks)
- F. **SEMESTER(S) OFFERED:** Fall
- G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**  
2 hours lecture per week
- H. **CATALOG DESCRIPTION:** The fundamentals of refrigerating and air conditioning equipment are the emphasis of this course. Students study the basic refrigeration cycle and the function of each component; compressor, condenser, evaporator and metering device.
- I. **PRE-REQUISITES/CO-REQUISITES:** None
- J. **GOALS (STUDENT LEARNING OUTCOMES):**  
By the end of this course, the student will be able to:

<b><u>Course Objective</u></b>	<b><u>Institutional SLO</u></b>
a. Describe the components of a refrigeration system	3. Foundational Skills
b. Size an evaporator, condenser, and compressor	3. Foundational Skills
c. Identify refrigeration systems and their applications	3. Foundational Skills
d. Introduction to the components and theory of basic electrical circuits	3. Foundational Skills
e. Determine the proper devices to measure temperature and pressure	3. Foundational Skills

- K. **TEXT:** Auvil, Ronnie J., *HVAC and Refrigeration Systems*, ATP, 2015
- L. **REFERENCES:** N/A
- M. **EQUIPMENT:** Technical Enhanced classroom

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

O. **MEASUREMENT CRITERIA/METHODS:**

- Exams
- Quizzes
- Homework
- Participation

P. **DETAILED COURSE OUTLINE:**

- I. Fundamentals of Refrigeration
  - A. Heat and Heat Flow
  - B. Temperature Measurement
  - C. Pressure Measurement
  - D. Heat Transfer
  - E. Sensible and Latent Heat
  - F. Energy Units
- II. Refrigeration Tools and Materials
  - A. Pipe and Tubing
  - B. Pipe Fitting and Sizes
- III. Hand Tools and Gages
  - A. Instruments
  - B. Refrigerants and Oils
  - C. Service Valves
  - D. System Evacuation
- IV. Basic Refrigeration Systems
  - A. Fixed orifice
  - B. Variable orifice
- V. Compression Systems and Compressors
  - A. Compression Cycle
  - B. Evaporators
  - C. Filter-Driers
  - D. Compressors
  - E. Condensers
  - F. Receivers
  - G. Controls
  - H. Compressor Types
  - I. Motors
- VI. Refrigerant Controls
  - A. AEV
  - B. TXV
  - C. Flash Gas and Superheat
  - D. TEXV
  - E. Solenoid Valves
  - F. Equalizers
  - G. Capillary Tubes

- H. Control Systems
- I. Differential and Range Adjustment
- J. Motor Controls
- K. Defrost Controls
- L. Checking, Testing, and Servicing Controls
- VII. Refrigerants
  - A. Refrigerant Identification
  - B. Pressure-Temperature Curves
  - C. Group One Through Three Refrigerants
  - D. Expendable Refrigerants
  - E. Refrigerant Cylinders
  - F. Using Pressure-Temperature Curves
  - G. Refrigerant Applications
  - H. Refrigeration Oil
  - I. Changing Refrigerants
  - J. New Refrigerants
  - K. Ozone Protection-EPA Guidelines

**Q. LABORATORY OUTLINE: N/A**

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



**PRELIMINARY COURSE OUTLINE**

**HVAC 102 – Refrigeration Lab I**

**Prepared By: Stan Skowronek**

**CANINO SCHOOL OF ENGINEERING TECHNOLOGY  
MECHANICAL & ENERGY TECHNOLOGIES  
September 2017**

- A. **TITLE:** Refrigeration Lab I
- B. **COURSE NUMBER:** HVAC 102
- C. **CREDIT HOURS:** 3 cr. hr.
- D. **WRITING INTENSIVE COURSE:** No
- E. **COURSE LENGTH:** (15 weeks)
- F. **SEMESTER(S) OFFERED:** Fall
- G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**  
6 hours lab per week
- H. **CATALOG DESCRIPTION:** Students apply knowledge of the basic refrigeration cycle and the function of each component; compressor, condenser, evaporator and metering device in laboratory experiments. Use of hand and power tools is stressed in laboratory work. Students cut, bend, solder, braze, flare, and swage cooper tubing. Flowing nitrogen is stressed during brazing operations.
- I. **PRE-REQUISITES/CO-REQUISITES:** Pre- requisite or Co-requisites HVAC 101
- J. **GOALS (STUDENT LEARNING OUTCOMES):**  
By the end of this course, the student will be able to:

<b><u>Course Objective</u></b>	<b><u>Institutional SLO</u></b>
a. Select and operate basic service tools and equipment	3. Foundational Skills
b. Perform joining techniques to complete tubing and pipe connections	3. Foundational Skills
c. Identify refrigeration systems and their applications	3. Foundational Skills
d. Introduction to the components and theory of basic electrical circuits	3. Foundational Skills
e. Demonstrate the ability to measure temperature and pressure using appropriate devices	3. Foundational Skills
f. Work with a diverse group, completing a common task	4. Social Responsibility

- K. **TEXT:** Lab Manual
- N. **REFERENCES:** N/A

O. **EQUIPMENT:** NS 101 lab equipment & HVAC refrigeration tool list

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

O. **MEASUREMENT CRITERIA/METHODS:**

- Exams
- Quizzes
- Lab Reports
- Participation

P. **DETAILED COURSE OUTLINE:** N/A

Q. **LABORATORY OUTLINE:**

- I. Introduction
  - A. Safety
  - B. Tools
- II. Tubing Skills
  - A. Tube forming
  - B. Brazing
  - C. Assembly
- III. Heat Transfer
  - A. Conduction, Convection, Radiation
  - B. Insulation
- IV. Change of State
  - A. Water
  - B. Steam ice
- V. Refrigeration Cycle
  - A. Compressor
  - B. Condenser
  - C. Expansion
  - D. Evaporator
- VI. Pressure Measurement
  - A. Psi
  - B. Iwc
  - C. Feet of head
- VII. Refrigerant Handling
  - A. Moving refrigerants
  - B. Recovery
  - C. Charging basics
- VIII. Single Phase Power
  - A. Safety/ isolation
  - B. Simple circuits
- IX. Low Voltage Control
  - A. Transformers
  - B. Relays
  - C. Thermostats
  - D.

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



**COURSE OUTLINE**

**HVAC 103 – Heating Systems I**

**Prepared By: Stan Skowronek**

**CANINO SCHOOL OF ENGINEERING TECHNOLOGY  
MECHANICAL & ENERGY TECHNOLOGIES  
September 2017**



- A. **TITLE:** Heating Systems I
- B. **COURSE NUMBER:** HVAC 103
- C. **CREDIT HOURS:** 3
- D. **WRITING INTENSIVE COURSE:** No
- E. **COURSE LENGTH:** 15 weeks
- F. **SEMESTER(S) OFFERED:** Fall
- G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**  
3- one hour lecture per week
- H. **CATALOG DESCRIPTION:** The fundamentals of heating equipment are the emphasis of this course. Students study basic heat transfer and the application of different fuels used in the heating industry.
- I. **PRE-REQUISITES/CO-REQUISITES:** None
- J. **GOALS (STUDENT LEARNING OUTCOMES):**  
By the end of this course, the student will be able to:

<i><u>Course Objective</u></i>	<i><u>Institutional SLO</u></i>
a. Explain the process of heat transfer	3. Foundational Skills
b. Describe types of distribution systems	3. Foundational Skills
c. Identify chimney types and proper application	3. Foundational Skills
d. Introduction to the control and power circuits of heating systems	3. Foundational Skills

- K. **TEXT:**
- P. **REFERENCES:** N/A
- Q. **EQUIPMENT:** Technical enhanced classroom
- N. **GRADING METHOD:** A-F
- O. **MEASUREMENT CRITERIA/METHODS:**
- Exams

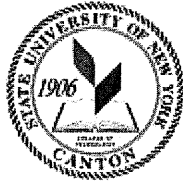
- Quizzes
- Homework
- Participation

**P. DETAILED COURSE OUTLINE:**

- I. Basic Theory of Heating Systems
  - A. Heat Transfer
    - i. Conduction,
    - ii. Convection,
    - iii. Radiation
  - B. Insulation
  - C. Change of State
    - i. Water
    - ii. Steam ice
- II. Hydronic systems
  - A. Pumps
  - B. Pipes sizing
  - C. Heat emitters
- III. Furnaces
  - A. Fans
  - B. Ducts
  - C. Registers and grills
- IV. Chimney
  - A. Natural gas and propane
  - B. Fuel oil
  - C. Wood and coal
  - D. Direct venting
- V. Troubleshooting
  - A. Customer interaction
  - B. Sequence of operation
  - C. Electrical circuits
  - D. Ladder diagrams

**Q. LABORATORY OUTLINE:**

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**COURSE OUTLINE**

**HVAC 104 – Heating Systems Lab I**

**Prepared By: Stan Skowronek**

**CANINO SCHOOL OF ENGINEERING TECHNOLOGY  
MECHANICAL & ENERGY TECHNOLOGIES  
September 2017**

- A. **TITLE:** Heating Systems Lab I
- B. **COURSE NUMBER:** HVAC 104
- C. **CREDIT HOURS:** 2
- D. **WRITING INTENSIVE COURSE:** No
- E. **COURSE LENGTH:** 15 weeks
- F. **SEMESTER(S) OFFERED:** Fall
- G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**  
2- three hour labs per week
- H. **CATALOG DESCRIPTION:** The fundamentals of heating equipment are the emphasis of this course. Students study basic heat transfer and the application of different fuels used in the heating industry. Safe use of hand and power tools is stressed in laboratory work.
- I. **PRE-REQUISITES/CO-REQUISITES:** Pre-requisite or Co-requisite HVAC 103 Heating System I
- J. **GOALS (STUDENT LEARNING OUTCOMES):**  
By the end of this course, the student will be able to:

<b><u>Course Objective</u></b>	<b><u>Institutional SLO</u></b>
a. Select and operate basic service tools and equipment	3. Foundational Skills
b. Perform joining techniques to complete tubing and pipe connections	3. Foundational Skills
c. Install basic heating systems and distribution systems	3. Foundational Skills
d. Install basic electrical controls and power for heating systems	3. Foundational Skills
e. Demonstrate the ability to measure temperature and pressure using appropriate devices	3. Foundational Skills
f. Work with a diverse group, completing a common task	4. Social Responsibility

- K. **TEXT:** Lab Manual
- R. **REFERENCES:** N/A
- S. **EQUIPMENT:** NN 101 and NS 139 and HVAC Tool list
- N. **GRADING METHOD:** A-F
- O. **MEASUREMENT CRITERIA/METHODS:**
- Lab reports
  - Participation
- P. **DETAILED COURSE OUTLINE:** N/A
- Q. **LABORATORY OUTLINE:**
1. Insulation R value on pipes and ducts
  2. Change of State of Water
  3. Hydronic boiler installs
  4. Furnaces installs
  5. Chimney installs
  6. Pump flow
  7. Furnace pressure switch
  8. Furnace extraction fan
  9. Call of no heat
  10. Clock Natural Gas meter
  11. Temperature rise on furnace
  12. Air flow in duct
  13. Air flow balancing
  14. Adjustment of gas valve

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**COURSE OUTLINE**

**HVAC105 – Heating Systems II**

**Prepared By: Stan Skowronek**

**CANINO SCHOOL OF ENGINEERING TECHNOLOGY**

## MECHANICAL & ENERGY TECHNOLOGIES

September 2017

- A. **TITLE:** Heating Systems II
- B. **COURSE NUMBER:** HVAC105
- C. **CREDIT HOURS:** 3
- D. **WRITING INTENSIVE COURSE:** No
- E. **COURSE LENGTH:** 15 weeks
- F. **SEMESTER(S) OFFERED:** Spring
- G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**  
3 one-hours lecture per week
- H. **CATALOG DESCRIPTION:** This course covers the procedures and materials required to install residential and light commercial heating and air conditioning equipment. Field piping and electrical wiring installation is studied. Material takeoffs are performed utilizing building plans, and from field measurements. Thermostats and control equipment is also covered.
- I. **PRE-REQUISITES/CO-REQUISITES:** Pre-requisite - HVAC103 Heating Systems I, and HVAC 104
- J. **GOALS (STUDENT LEARNING OUTCOMES):**  
By the end of this course, the student will be able to:

<b><i>Course Objective</i></b>	<b><i>Institutional SLO</i></b>
a. Explain components and functions in commercial and residential HVAC applications, relating them to building plans.	<b>3. Foundational Skills</b>
b. Explain and perform the proper procedures used in installing components, field piping, and field wiring.	<b>3. Foundational Skills</b>
c. Demonstrate procedures for starting up newly installed HVAC equipment	<b>3. Foundational Skills</b>
d. Demonstrate the evaluation of operating HVAC equipment	<b>3. Foundational Skills</b>

- K. **TEXT:** Cooper, William B., Raymond E. Lee, Raymond A. Quinlan, Martin W. Sirowatka, Warm Air Heating for Climate Control, 5<sup>th</sup> Edition, Prentice Hall, 2003

- T. REFERENCES:** N/A
- U. EQUIPMENT:** Technical enhanced classroom
- N. GRADING METHOD:** A-F
- O. MEASUREMENT CRITERIA/METHODS:**
- Exams
  - Quizzes
  - Homework
  - Participation
- P. DETAILED COURSE OUTLINE:**
1. Hydronic Systems
    - 1.1. Boilers
    - 1.2. Piping configurations
    - 1.3. Pumps
    - 1.4. Expansion tanks
    - 1.5. Pressure regulators
    - 1.6. Make up water operation
    - 1.7. Filling and Purging
    - 1.8. Combustion analysis
  2. Heat Emitters
    - 2.1. Heating coils
    - 2.2. Fin Tubing
    - 2.3. Radiators
    - 2.4. Radiant panels
    - 2.5. Radiant floors



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**COURSE OUTLINE**

**HVAC106 – Residential & Light Commercial Installation**

**Prepared By: Stan Skowronek**

**CANINO SCHOOL OF ENGINEERING TECHNOLOGY  
MECHANICAL & ENERGY TECHNOLOGIES  
September 2017**

- A. **TITLE:** Residential & Light Commercial Installation
- B. **COURSE NUMBER:** HVAC106
- C. **CREDIT HOURS:** 2
- D. **WRITING INTENSIVE COURSE:** No
- E. **COURSE LENGTH:** (15 weeks)
- F. **SEMESTER(S) OFFERED:** Spring
- G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**  
(2) three-hour labs per week
- H. **CATALOG DESCRIPTION:** This course covers the procedures and materials required to install residential and light commercial heating and air conditioning equipment. Field piping and electrical wiring installation is studied. Material takeoffs are performed utilizing building plans, and from field measurements. Thermostats and control equipment is also covered.
- I. **PRE-REQUISITES/CO-REQUISITES:** Pre-requisite CONS 151, Pre-requisite or co-requisite HVAC105
- J. **GOALS (STUDENT LEARNING OUTCOMES):**  
By the end of this course, the student will be able to:

<b><u>Course Objective</u></b>	<b><u>Institutional SLO</u></b>
a. Explain components and functions in commercial and residential HVAC applications, relating them to building plans.	<b>3. Foundational Skills</b>
b. Explain and perform the proper procedures used in installing components, field piping, and field wiring.	<b>3. Foundational Skills</b>
c. Demonstrate procedures for evacuating and recharging a refrigeration system.	<b>3. Foundational Skills</b>
d. Demonstrate procedures for starting up newly installed HVAC equipment	<b>3. Foundational Skills</b>
e. Demonstrate the evaluation of operating HVAC equipment	<b>3. Foundational Skills</b>

- K. **TEXT:**

V. **REFERENCES:** N/A

W. **EQUIPMENT:** HVAC tool list

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

O. **MEASUREMENT CRITERIA/METHODS:**

- Exams
- Quizzes
- Homework
- Lab Reports
- Participation

P. **DETAILED LABORATORY OUTLINE:**

1. Install an evaporator coil on furnace
2. Install a condenser unit
3. Control systems for Split Systems
4. Air Handler Unit DX coil
5. Chilled water installation
6. Economizer installation
7. Duct installation and verification of air flow
8. Fan controls
9. Damper motor controls
10. Enthalpy Recovery Unit
11. Troubleshooting labs (three weeks)

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**COURSE OUTLINE**

**HVAC 110 – Plumbing**

**Prepared By: Michael J. Newtown, P.E.**

**CANINO SCHOOL OF ENGINEERING TECHNOLOGY  
MECHANICAL & ENERGY TECHNOLOGIES  
April 2018**

- A. **TITLE:** Plumbing
- B. **COURSE NUMBER:** HVAC 110
- C. **CREDIT HOURS:** 3
- D. **WRITING INTENSIVE COURSE:** No
- E. **COURSE LENGTH:** 15 weeks
- F. **SEMESTER(S) OFFERED:** Spring
- G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**  
2- one hour lecture and 1 – 3 hour lab per week
- H. **CATALOG DESCRIPTION:** The fundamentals of residential and commercial plumbing are explained in lecture and applied in laboratory projects. Plumbing code is reviewed to ensure compliance and explain how systems operate properly thus ensuring adequate supply of water and removal of waste from buildings.
- I. **PRE-REQUISITES/CO-REQUISITES:** None
- J. **GOALS (STUDENT LEARNING OUTCOMES):**  
By the end of this course, the student will be able to:

<i>Course Objective</i>	<i>Institutional SLO</i>
a. Explain and demonstrate pipe joining methods	3. Foundational Skills
b. Layout distribution systems	3. Foundational Skills
c. Explain waste and vent systems	3. Foundational Skills
d. Interpret plumbing drawings in plan, side, and isometric views	3. Foundational Skills

- K. **TEXT:** Joyce, Michael, Residential Construction Academy Plumbing, Thomson Delmar, 2005
- X. **REFERENCES:** N/A
- Y. **EQUIPMENT:** Technical enhanced classroom and laboratory space
- N. **GRADING METHOD:** A-F
- O. **MEASUREMENT CRITERIA/METHODS:**

- Exams
- Quizzes
- Homework
- Laboratory reports
- Participation

**P. DETAILED COURSE OUTLINE:**

- I. Piping Nomenclature
  - A. Pipe material
  - B. Purpose of each type
  - C. Fittings
- II. Pipe Joining
  - A. Soldering
  - B. Brazing
  - C. Glue and Priming
  - D. Mechanical connections
- III. Fixtures
  - A. Lavatories
  - B. Water Closets
  - C. Tubs and Showers
  - D. Kitchen Sinks
  - E. Washing Machines
  - F. Dishwashers
- IV. Wells
  - A. Pumps
  - B. Shallow Wells
  - C. Deep Wells
  - D. Components of a well
  - E. Sizing of well and components
- V. Waste removal
  - A. Drains
  - B. Vents
  - C. Piping fittings
  - D. Septic/ sewage systems
- VI. Commercial Piping
  - A. Cast Iron
  - B. Plastic
  - C. Copper
- VII. Piping Views of drawings
  - A. Plan view
  - B. Side view
  - C. Isometric view
- VIII. Take offs
  - A. Bill of material
  - B. Estimates of material
  - C. Estimating installation time

**Q.    LABORATORY OUTLINE:**

1. Soldering
2. Thread cutting
3. Dry fitting pipe and fittings
4. Waste and vents layout
5. Install water closet
6. Install lavatories
7. Install tub/ shower
8. Install well pumps
9. Install expansion tanks
10. Estimating a bathroom material
11. Create an isometric view of existing piping
12. Install water heater

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**COURSE OUTLINE**

**HVAC 201– HVAC Electricity, Motors, and Controls**

**Prepared By: Michael J. Newtown, P.E.**

**CANINO SCHOOL OF ENGINEERING TECHNOLOGY  
MECHANICAL & ENERGY TECHNOLOGIES  
April 2018**



- A. **TITLE:** HVAC Electricity, Motors, and Controls
- B. **COURSE NUMBER:** HVAC 201
- C. **CREDIT HOURS:** 2
- D. **WRITING INTENSIVE COURSE:** No
- E. **COURSE LENGTH:** 15 weeks
- F. **SEMESTER(S) OFFERED:** Fall
- G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**  
2 one-hours lecture per week
- H. **CATALOG DESCRIPTION:** This course introduces students to AC and DC circuits, interpretation of electrical schematics, troubleshooting using test equipment, motors types and uses, and installation of electrical equipment in compliance with local, state, and national codes. The sequence of controls in HVAC are explored in details allowing students to correct electrical faults or diagnose hardware problems.
- I. **PRE-REQUISITES/CO-REQUISITES:**  
Pre-requisite: HVAC105 Heating Systems II
- J. **GOALS (STUDENT LEARNING OUTCOMES):**  
By the end of this course, the student will be able to:

<b><u>Course Objective</u></b>	<b><u>Institutional SLO</u></b>
a. Determine the voltage, amperage, resistance, and impedance of electrical circuits used in HVAC	<b>3. Foundational Skills</b>
b. Explain and perform the proper procedures used in troubleshooting electrical faults in HVAC equipment.	<b>3. Foundational Skills</b>
c. Demonstrate prior troubleshooting of electrical controls of HVAC appliances.	<b>3. Foundational Skills</b>
d. Demonstrate proper installation of HVAC electrical controls and wiring.	<b>3. Foundational Skills</b>

- K. **TEXT:** Auvil, Ronnie J., *HVAC and Refrigeration Systems, ATP, 2015*
- Z. **REFERENCES:** Cooper, William B., Raymond E. Lee, Raymond A. Quinlan, Martin W. Sirowatka, *Warm Air Heating for Climate Control, 5<sup>th</sup> Edition, Prentice Hall, 2003*

AA. **EQUIPMENT:** Technical enhanced classroom

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

O. **MEASUREMENT CRITERIA/METHODS:**

- Exams
- Quizzes
- Homework
- Participation

P. **DETAILED COURSE OUTLINE:**

1. Ohms Law
  - a. Resistors
  - b. Amperage
  - c. Voltage
2. Series circuits
  - a. Voltage summation
  - b. Amperage measurement
3. Parallel circuits
  - a. Voltage summation
  - b. Amperage measurement
4. AC Circuits
  - a. Impedance
  - b. Measurement
  - c. Amperage
  - d. Voltage
5. Single Phase power
6. Three phase power
  - a. Delta
  - b. Wye
7. Capacitors
  - a. Run
  - b. Start
8. Motor types
  - a. ECM
  - b. Stator Winding
9. Sequence of operations
10. Proper troubleshooting techniques
11. Electrical wiring
  - a. Wire size and type
  - b. Amperage capacities
  - c. Termination
  - d. Box fastening methods
12. Electrical Code

Q. **DETAILED LABORATORY OUTLINE:** N/A

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**COURSE OUTLINE**

**HVAC 202– HVAC Electricity, Motors, and Controls Lab**

**Prepared By: Michael J. Newtown, P.E.**

**CANINO SCHOOL OF ENGINEERING TECHNOLOGY  
MECHANICAL & ENERGY TECHNOLOGIES  
April 2018**

- A. **TITLE:** HVAC Electricity, Motors, and Controls Lab
- B. **COURSE NUMBER:** HVAC 202
- C. **CREDIT HOURS:** 2
- D. **WRITING INTENSIVE COURSE:** No
- E. **COURSE LENGTH:** 15 weeks
- F. **SEMESTER(S) OFFERED:** Fall
- G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**  
(2) three-hour labs per week
- H. **CATALOG DESCRIPTION:** This course develop hands-on skills at troubleshooting electrical faults, motors, and control sequences.
- I. **PRE-REQUISITES/CO-REQUISITES:**  
Co-Requisite: HVAC 201 HVAC Electricity, Motors, and Controls
- J. **GOALS (STUDENT LEARNING OUTCOMES):**  
By the end of this course, the student will be able to:

<b><u>Course Objective</u></b>	<b><u>Institutional SLO</u></b>
a. Determine the voltage, amperage, resistance, and impedance of electrical circuits used in HVAC	<b>3. Foundational Skills</b>
b. Troubleshooting electrical faults in HVAC equipment.	<b>3. Foundational Skills</b>
c. Demonstrate proper installation of HVAC electrical controls and wiring.	<b>3. Foundational Skills</b>

- K. **TEXT:** Auvil, Ronnie J., *HVAC and Refrigeration Systems*, ATP, 2015 and Local Lab Manual
- L. **REFERENCES:** Cooper, William B., Raymond E. Lee, Raymond A. Quinlan, Martin W. Sirowatka, *Warm Air Heating for Climate Control*, 5<sup>th</sup> Edition, Prentice Hall, 2003
- M. **EQUIPMENT:** Technical enhanced classroom
- N. **GRADING METHOD:** A-F
- O. **MEASUREMENT CRITERIA/METHODS:**
- Laboratory reports

- Participation
- 

**P. DETAILED COURSE OUTLINE: N/A**

**Q. DETAILED LABORATORY OUTLINE:**

1. Ohms Laws
2. Proper use of multimeters
3. DC analysis of series circuits voltage
4. DC analysis of series circuits amperage
5. DC analysis of parallel circuits voltage
6. DC analysis of parallel circuits amperage
7. AC circuits measurement
8. Single phase circuits
9. Three phase circuits
10. Capacitors
11. Motor windings and measurement
12. Motor direction controls
13. Sequence operation of HVAC Appliances
14. Use of meters in troubleshooting
15. Replacement and installation of electrical panels
16. Troubleshooting digital control boards
17. Conduit bending and installation
18. Metal covered cable installation
19. Junction, handy, and switch boxes installation
20. Entrance panel and breaker box installation

**STATE UNIVERSITY OF NEW YORK  
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**PRELIMINARY COURSE OUTLINE**

**HVAC 203– Commercial Refrigeration**

**Prepared By: Stan Skowronek**

**CANINO SCHOOL OF ENGINEERING TECHNOLOGY  
MECHANICAL & ENERGY TECHNOLOGIES  
September 2017**

- A. **TITLE:** Commercial Refrigeration
- B. **COURSE NUMBER:** HVAC 203
- C. **CREDIT HOURS:** 2
- D. **WRITING INTENSIVE COURSE:** No
- E. **COURSE LENGTH:** 15 weeks
- F. **SEMESTER(S) OFFERED:** Spring
- G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**  
2 hours lecture per week
- H. **CATALOG DESCRIPTION:** The fundamentals of refrigerating and air conditioning equipment are the emphasis of this course. Students study the basic refrigeration cycle and the function of each component; compressor, condenser, evaporator and metering device. Use of hand and power tools is stressed in laboratory work. Students cut, bend, solder, braze, flare, and swage cooper tubing. Flowing nitrogen is stressed during brazing operations.
- I. **PRE-REQUISITES/CO-REQUISITES:** Pre-requisite HVAC 101 & HVAC 102
- J. **GOALS (STUDENT LEARNING OUTCOMES):**  
By the end of this course, the student will be able to:

<b><u>Course Objective</u></b>	<b><u>Institutional SLO</u></b>
<b><u>Course Objective</u></b>	<b><u>Institutional SLO</u></b>
a. Explain components and functions in commercial and industrial refrigeration applications.	<b>3. Foundational Skills</b>
b. Explain the proper procedures used in replacing or repairing defective commercial components.	<b>3. Foundational Skills</b>
c. Explain procedures for evacuating and recharging a refrigeration system.	<b>3. Foundational Skills</b>
d. Calculate heat loads for refrigeration	<b>3. Foundational Skills</b>
e. Read and interpret pressure-enthalpy diagrams charts and scales	<b>3. Foundational Skills</b>

- K. **TEXT:** Laboratory Manual & Auvil, Ronnie J., *HVAC and Refrigeration Systems, ATP, 215*

- N. **REFERENCES:** N/A
- O. **EQUIPMENT:** Technical Enhanced Classroom
- N. **GRADING METHOD:** A-F
- O. **MEASUREMENT CRITERIA/METHODS:**
- Exams
  - Quizzes
  - Homework
  - Participation
- P. **DETAILED COURSE OUTLINE:**
- I. Refrigerants
- A. Refrigerant Identification
  - B. Pressure-Temperature Curves
  - C. Group One Through Three Refrigerants
  - D. Expendable Refrigerants
  - E. Refrigerant Cylinders
  - F. Using Pressure-Temperature Curves
  - G. Refrigerant Applications
  - H. Refrigeration Oil
  - I. Changing Refrigerants
  - J. New Refrigerants
  - K. Ozone Protection-EPA Guidelines
- II. Control Systems
- A. Controllers
  - B. Thermostats
  - C. Relays
  - D. Limits
  - E. Control Circuits
  - F. Split System Controls
  - G. Control Servicing
- III. Cooling Loads
- A. Heat Transfer
  - B. U and R Factors
  - C. Design Temperature
  - D. Infiltration and Ventilation
  - E. Internal Heat Gain
  - F. Total Cooling Loads
  - G. Equipment Selection
- IV. EPA Requirements
- A. CFC's and The Ozone Layer
  - B. Replacement Refrigerants
  - C. Refrigerant Recovery
  - D. EPA 608 exam review
- Q. **LABORATORY OUTLINE:** NA



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**PRELIMINARY COURSE OUTLINE  
HVAC 204 – Commercial Refrigeration Lab**

**Prepared By: Stan Skowronek**

**CANINO SCHOOL OF ENGINEERING TECHNOLOGY  
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September 2017**

- A. **TITLE:** Commercial Réfrigération Lab.
- B. **COURSE NUMBER:** HVAC 204
- C. **CREDIT HOURS:** 3
- D. **WRITING INTENSIVE COURSE:** No
- E. **COURSE LENGTH:** 15 weeks
- F. **SEMESTER(S) OFFERED:** Spring
- G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**  
(3) - three hour labs per week
- H. **CATALOG DESCRIPTION:** The repair of refrigerating and air conditioning equipment are the emphasis of this course. Students remove and replace the basic refrigeration cycle and the function of each component; compressor, condenser, evaporator and metering device. Use of hand and power tools is stressed in laboratory work. Students cut, bend, solder, braze, flare, and swage cooper tubing. Flowing nitrogen is stressed during brazing operations.
- I. **PRE-REQUISITES/CO-REQUISITES:**  
Pre or Co-requisite HVAC 203, Commercial Refrigeration
- J. **GOALS (STUDENT LEARNING OUTCOMES):**  
By the end of this course, the student will be able to:

<b><u>Course Objective</u></b>	<b><u>Institutional SLO</u></b>
a. Remove and replace components and functions in commercial and industrial refrigeration applications.	<b>3. Foundational Skills</b>
b. Demonstrate procedures for evacuating and recharging a refrigeration system.	<b>3. Foundational Skills</b>
c. Read and interpret pressure-enthalpy diagrams charts and scales	<b>3. Foundational Skills</b>
d. Demonstrate proper installation and service of refrigeration systems	<b>3. Foundational Skills</b>

- K. **TEXT:** Laboratory Manual; & Auvil, Ronnie J., *HVAC and Refrigeration Systems, ATP*, 2015

- P. **REFERENCES:** N/A
- Q. **EQUIPMENT:** HVAC refrigeration tool list
- N. **GRADING METHOD:** (A-F)
- O. **MEASUREMENT CRITERIA/METHODS:**
- Lab Reports
  - Participation

- P. **DETAILED COURSE OUTLINE:** NA

- Q. **LABORATORY OUTLINE:**

- I. Commercial refrigeration controls
  - A. Pump down systems
  - B. Defrost controls
  - C. Fan delays
  - D. Electric defrost
  - E. Hot gas defrost
  - F. Passive defrost
  - G. Liquid line heat exchangers
  - H. Multivoltage systems
- II. Wiring and installation
  - A. Compressors
  - B. Defrost controls
  - C. Solenoids
  - D. Service panels
  - E. Cold controls, electronic & mechanical
  - F. Pressure switches
  - G. Start relays & caps
- III. Refrigeration projects

The remaining 10 weeks provides students with the opportunity to repair, relocate, and install refrigeration equipment, including:

- Ice makers
- Walk in cooler equipment
- Commercial refrigerators
- Water chillers
- Residential refrigerators & freezers
- Industrial condensing units

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**PRELIMINARY COURSE OUTLINE**

**HVAC205 HVAC Service, Troubleshooting & Repair**

**Prepared By: Stan Skowronek**

**CANINO SCHOOL OF ENGINEERING TECHNOLOGY  
MECHANICAL & ENERGY TECHNOLOGIES**

**September 2017**

- A. **TITLE:** HVAC Service, Troubleshooting & Repair
- B. **COURSE NUMBER:** HVAC 205
- C. **CREDIT HOURS:** 3
- D. **WRITING INTENSIVE COURSE:** Yes
- E. **COURSE LENGTH:** 15 weeks
- F. **SEMESTER(S) OFFERED:** Fall
- G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**  
2 hours of lecture, 3 hours of lab per week
- H. **CATALOG DESCRIPTION:** This course covers the analysis and repair of HVAC systems. Students utilize electrical meters, pressure measuring equipment, and airflow testers to determine the performance of HVAC systems. Identification and repair of defective components is the focus of this course. Analysis of misapplication is also studied.
- I. **PRE-REQUISITES/CO-REQUISITES:**  
Pre-requisite: CONS151 Building Trades- Blueprint Reading & Drafting, HVAC105 Heating Systems II,  
Pre- or Co-requisite: HVAC 201 HVAC Electrical and Motor Control I
- J. **GOALS (STUDENT LEARNING OUTCOMES):**  
By the end of this course, the student will be able to:

<b><u>Course Objective</u></b>	<b><u>Institutional SLO</u></b>
a. Explain components and functions in commercial and residential HVAC applications, relating them to building plans.	1.Communications 3. Foundational skills
b. Explain and perform the proper procedures used in installing components, field piping, and field wiring.	1.Communications 3. Foundational skills
c. Demonstrate procedures for evacuating and recharging a refrigeration system.	3. Foundational skills
d. Demonstrate procedures for starting up newly installed HVAC equipment	3. Foundational Skills
e. Demonstrate the evaluation of operating HVAC equipment	3. Foundational Skills

K. **TEXT:** Cooper, William B., Raymond E. Lee, Raymond A. Quinlan, Martin W. Sirowatka, Warm Air Heating for Climate Control, 5<sup>th</sup> Edition, Prentice Hall, 2003

R. **REFERENCES:** N/A

S. **EQUIPMENT:** NS 101 and 139 laboratories

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

O. **MEASUREMENT CRITERIA/METHODS:**

- Exams
- Quizzes
- Lab Reports
- Participation

P. **DETAILED COURSE OUTLINE:**

3. Split Systems
  - 3.1. Gas furnaces
  - 3.2. Cased AC split systems
  - 3.3. Mini splits
  - 3.4. Oil furnaces
  - 3.5. Electric air handlers
  - 3.6. Split system controls
4. Packaged units
  - 4.1. Field wiring
  - 4.2. Field piping
  - 4.3. Ductwork attachment
  - 4.4. Packaged heat pumps
5. Air Handlers
  - 5.1. DX/ Gas systems
  - 5.2. Chilled water/ Gas systems
  - 5.3. Fan maintenance
  - 5.4. Economizers
  - 5.5. Commercial controls

Q. **LABORATORY OUTLINE:**

1. Gas furnace testing and trouble shooting
2. Oil furnace testing and trouble shooting
3. Cased AC split system testing and trouble shooting
4. Mini split faults and diagnoses
5. Unitarian units testing and diagnoses
6. Trouble shooting wiring shorts

7. Commercial Systems diagnoses
  - a. DX systems
  - b. Chillers
  - c. Absorption units
  - d. Heat exchangers
8. Building control system troubleshooting
9. Additional systems as time is available