Version 2013-10-09

New York City College of Technology, CUNY

CURRICULUM MODIFICATION PROPOSAL FORM

This form is used for all curriculum modification proposals. See the Proposal Classification Chart for information about what types of modifications are major or minor. Completed proposals should be emailed to the Curriculum Committee chair.

Title of Proposal	**HVAC Concentration of the BTECH of Mechanical Engineering Technology**
Date	**1/8/2024**
Major or Minor	**Major**
Proposer's Name	**Dr. Akm Rahman**
Department	**Mechanical Engineering Technology**
Date of Departmental Meeting in which proposal was approved	**10/25/2023**
Department Chair Name	**Dr. Akm Rahman**
Department Chair Signature and Date	S. Rahman
Academic Dean Name	**Dr. Gerarda Shields**
Academic Dean Signature and Date	Gerarda M. Shields Digitally signed by Gerarda M. Shields Date: 2024.01.05 14:07:06 -05'00'
Brief Description of Proposal (Describe the modifications contained within this proposal in a succinct summary. More detailed content will be provided in the proposal body.	**A new concentration on HVAC engineering is proposed under the existing BTech Program in Mechanical Engineering Technology. This proposal includes 5 new senior level courses that will cover the contents and engineering aspects of Heating, Ventilation, Air Conditioning and Cooling and Refrigeration. Courses proposed in this concentration are Advanced Thermodynamics and heat Transfer; Fundamentals of Refrigeration and Air Conditioning; Design and Selection of Hearing and cooling systems; HVAC Energy Management T and Standards and Technologies in Smart Buildings.**
Brief Rationale for Proposal (Provide a concise summary of why this proposed change is important to the department. More detailed content will be provided in the proposal body).	**As the large metropolitan areas face challenges in reducing greenhouse gas and energy consumption through HVAC systems, this career-focused concentration will train and educate graduating engineers and prepare them work in the field of HVAC and MEP engineering.**
Proposal History (Please provide history of this proposal: is this a resubmission? An updated version? This may most easily be expressed as a list).	**This is a new proposal. All the courses in this proposal are newly submitted.**

Proposal of the HVAC Concentration of the BTech of Mechanical Engineering Technology

Proposed and Prepared by- Dr. Akm Rahman, Dr. Ozlem Yasar, Dr. Sidi Berri, Dr. Andy Zhang

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Description of Proposal

Introduction

A new HVAC (Heating, Ventilation, and Air Conditioning) concentration in the department of Mechanical Engineering Technology at City Tech is designed to provide students with advanced knowledge and skills in the design, operation, and maintenance of heating, ventilation, and air conditioning systems. Graduates of this concentration will be ready to work in the HVAC industry, which is critical for maintaining comfortable and safe indoor environments as well as optimal performance and energy efficiency for manufacturing powerhouses.

The MECH department, currently, offers three concentrations in its Bachelor of Technology program: the industrial design concentration, the manufacturing systems concentration, and the robotics concentration. The proposed HVAC concentration will address the important issues of heating, ventilation and air conditioning systems. It will also address the requests made by the department's industrial advisory board members.

The five courses in the HVAC concentration will give students necessary exposure to different elements of HVAC in the last four semesters of the BTech curriculum.

All courses in the HVAC concentration are designated as elective courses. They are designed to give students who want to develop HVAC expertise, needed knowledge and hands-on skills so they can work as HVAC designers, energy systems technicians, or similar roles within the HVAC industry.

Rationale

High-rise buildings in New York City are considered as one of the prominent sources of Green House Gas (GHG). NYC has established a wide range of goals to reduce 80% amount greenhouse emissions by 2050 (80x50 rule). In NYC, there are 50,000 buildings larger than 25,000 square feet, and the new rule requires a 20% reduction in their energy use by 2030.

To achieve this goal, NYC requires many mechanical engineers and technologists to provide professional services in design, selection and commissioning of energy-efficient and compliant HVAC& R systems.. This urgency drives the need for introducing a new HVAC concentration in our BTECH program. The proposed HVAC concentration hopes to fulfill the need for well-versed engineers and technologists in urbanized metropolitan including New York City. This concentration is designed to teach advanced mechanical components, electrical needs, software, and smart technology for such efficient and energy-compliant HVAC systems.

As an Engineering Technology department, we believe that HVAC concentration will fulfill the high industrial demand in HVAC related jobs including MEP engineering, where graduates are capable in making $90,00-$120,000 per year. HVAC industry has tremendous growth potential due to the significance of climate control and energy efficiency in both residential and commercial buildings. For the regions like NYC that experience extreme climate conditions, high summer and low- freezing winter temperatures, and environmental concerns such as air pollution and ozone layer depletion; HVAC engineers and technicians are crucial in addressing these issues. These professionals can help designing systems to minimize energy consumption as well as maintaining a sustainable growth across the large metro area like NYC.

To support this concentration, we propose setting up an HVAC lab in the newly renovated room V 506 that would facilitate us hands-on learning activities. This will also help students relate theoretical knowledge to real-world problems. Lab experiments will help students understand HVAC systems and types of equipment, maintenance of equipment, and troubleshooting under controlled conditions. The new HVAC lab can also be used for research and development purposes. Professors can do research about new HVAC technologies and innovations, energy-efficiency problems, and indoor air quality improvements. This lab would expose students to the practical and operational side of heating, ventilation, and heating systems. HVAC research lab would also give the opportunity to collaborate with industrial partners, manufacturers and other research institutions. These collaborations will help exploring new technologies related to the HVAC industries.

We project that once this proposal gets into operation the number of students in this concentration will gradually increase. The table below outlines the projections of the number of students in this concentration.

Semester	**Enrollment Projections**
Fall 2024	40
Spring 2025	60
Fall 2025	80
Spring 2026	160

Faculty Hiring and Technological supports

The Mechanical Engineering Technology department has a plan to hire two new faculties who are specialized in the HVAC area. These two faculties can focus on different aspects of HVAC systems such as system design, control, maintenance, and energy efficiency. The department will also plan to subscribe licensed software to train students. Those software packages include but not limited to Auto Desk Revit, Elite CHVAC, Elite Fire, Trane-Trace Heating and Cooling Load, ComCheck. The department contacted the library (Library Report is attached) and found that no supporting text books or articles are available. Therefore, the department will work with the library to procure few course materials. Those include but not limited to International Mechanical Code from international code council ($90), ASHRAE 90.1 (from techstreet.com) ($188 printed form) as reference in the library and online subscription.

Advisory Board Meeting

On May 10,2023 an Industry advisory board meeting was held with the presence of 21 advisors. The proposal was presented in front of the advisors. All the advisors voted in support for the new HVAC concentration. They provided a valuable feedback on the proposal. One of those feedbacks were to include Building Management System (BMS), energy reduction strategy including electrification and heat pump technologies. A subcommittee was formed to address the issues and concerns.

Sub-Committee Activities

The department chair formed a sub-committee with Akm Rahman, Ozlem Yasar and Sidi Berri to address the issues and concerns discussed in the advisory board meeting. Two courses proposed as Energy Management Technology and standards (MECH 4880) and Technologies in Smart Building (MECH 4885) were developed as per the suggestions ~~from~~ of the industry advisory board.

Feedback and Comments from other departments and the Dean

Prior to submission, the proposal was shared with the Dean and other departments for comments and review. The environment control and Facilities Management (ECFM) department mentioned that there are some overlaps in the contents of the proposed courses MECH 3680 and MECH 4780, however they agreed that the background levels in Math, Physics and other mechanical engineering courses are higher than ECFM's existing courses. The courses proposed by the MET department are targeting the graduating seniors who need advanced technological knowledge on HVAC. Therefore, both the Dean and ECFM suggested that the courses proposed are appropriate for the graduating MET seniors and meet ABET ETAC criteria a-d.

HVAC Specialization in Mechanical Engineering Technology

Well-educated professionals are needed to design, install, and maintain HVAC systems. Moreover, nowadays, these systems become more complex and require more deep knowledge. The proposed HVAC concentration in the Department of Mechanical Engineering Technology at City Tech aligns with industry demands and addresses the current HVAC issues. Our well-structured curriculum helps students learn theoretical knowledge and gain hands-on experience in HVAC system design, control systems, energy efficiency, and sustainability areas. In this concentration program, students take basic mechanical engineering technology and general education classes in their first two years and then they take more advanced mechanical engineering technology classes

mostly in the HVAC field in their last two years. The below tables summarize the sample course of study:

Curriculum Map
Year 1:

Fall Semester:

Semester 1		**Total 13 Credits**
MECH 1101	Manufacturing Process Laboratory	1
IND 1112	Engineering Drawing I	2
MAT 1375	Precalculus or higher (MQR)	4
ENG 1101	English Composition I	3
Flex Core	Flexible Common Core Course	3

Spring Semester

Semester 2		**Total 18 to 19 Credits**
MECH 1201	Computer-Aided Manufacturing Systems	3
MECH 1222	Computer-Aided Engineering Graphics	2
MECH 1234	Statics and Strength of Materials	3
MECH 1240	Computer Applications in Mechanical Engineering Technology	2
MAT 1475	Calculus or higher (SW)	4
PHYS 1433 or PHYS 1441	General Physics I: Algebra-Based or General Physics I: Calculus-Based (LPS)	4 5

Year 2:

Fall Semester:

Semester 3		**Total 15 to 16 Credits**
IND 2304	Advanced Solid Modeling	2
MECH 2322	Engineering Materials	3
MECH 2333	Strength of Materials II	3
MECH 2335	Kinematics and Dynamics of Machines	3
PHYS 1434 or PHYS 1442	General Physics II: Algebra-Based or General Physics II: Calculus-Based (SW)	4 5

Spring Semester:

Semester 4		**Total 18 Credits**
MECH 2410	Machine Design	4
MECH 2426	Materials Testing Laboratory	1
MECH 2430	Thermodynamics	3
EET 1112	Circuit Analysis I	4
ENG 1121	English Composition II	3
Flex Course	Flex Common Core Course	3

Year 3:

Fall Semester:

Semester 5		**Total 13 Credits**
MECH 3500	Computer Programming and Applications	3
MECH 3510	Advanced Solid Modeling II	3
MECH 3580	**Advanced Thermodynamics and Heat Transfer**	**3**
MAT 1575	Calculus II or higher	4

Spring Semester:

Semester 6		**Total 12 Credits**
MECH 3600	Mechanical Measurements and Instrumentation	3
MECH 3650	Advanced Strength of Materials	3
MAT 2680	Differential Equations	3
MECH 3680	**Fundamentals of Refrigeration and Air Conditioning**	**3**

Year 4:

Fall Semester:

Semester 7		**Total 15 Credits**
MECH 4700	Fluid Mechanics	3
MECH 4730	Finite Element Methods	3
MECH 4760	Vibration and Advanced Dynamics	3
MECH 4780	**Design and Selection of Heating and Cooling Systems**	**3**
ID	Interdisciplinary Course	3

Spring Semester:

Semester 8		**Total 14 Credits**
MECH 4850	Senior Design Project	3
MECH 4860	Project Management	2
MECH 4880 Or	**HVAC Energy Management and Standards Or**	**3**
MECH 4885	**Technologies in Smart Buildings**	**3**
COM 1330	Public Speaking or higher	3
Lib Art	Liberal Arts Elective	3

ABET Guidelines

Our BTECH program is accredited by ABET ETAC committee. Any modification or changes are required to meet guidelines. Courses in this proposal are therefore designed to meet ABET ETAC guidelines for the HVAC curriculum.

A program on Air Conditioning, Refrigeration, Heating, and Ventilating Engineering Technology to be accredited by ABET needs to meet the following ETAC criteria

"*The curriculum must provide baccalaureate degree graduates with instruction in the knowledge, techniques, skills, and ability to use modern equipment in air conditioning, refrigerating, heating, and ventilating engineering technology.*
The curriculum must include instruction in the following topics:

a. basic HVAC&R engineering principles, including heat transfer, fluid mechanics, combustion, air conditioning and refrigeration processes, heating and cooling load calculations, electrical circuits, and controls;
b. application of HVAC&R principles for broadly-defined technical activities, including analysis of equipment and system performance, analysis of system controls, and computerized evaluation of system energy performance;
c. design and analysis of HVAC&R systems for commercial buildings, including pipe and duct design, HVAC&R equipment and system selection, building energy modeling, and economic analysis; and
d. project management for design and installation of HVAC&R systems."

Pre and Co-requisites for each of the proposed courses were chosen to ensure that the topics above are covered in the seamless manner. Both Titles and contents (As listed below) were chosen to avoid repetition and instructional gaps between the existing and proposed courses.

List of Courses Offered

1. Advanced Thermodynamics and Heat Transfer- MECH 3580
2. Principles of Refrigeration and Air Conditioning - MECH 3680
3. Design & Selection of Heating and Cooling System- MECH 4780
4. HVAC Energy Management and Standards- MECH 4880

5. Technologies in Smart Buildings-MECH 4885

Brief Outlines of the Courses

1. MECH 3580-Advanced Thermodynamics and Heat Transfer

Credit - 3 Credit Hours, 3 class hours.

Outline-

This course covers the applications of the laws of thermodynamics in refrigeration and HVAC system. This will also cover various modes of thermal-energy transportation in refrigeration and HVAC system.

Topics Include-

a. Thermodynamic Properties of liquids and gases
b. Energy, work, power, and efficiency
c. Heat Transfer fundamentals Heat Conduction, convection, and radiation.
d. Conduction
e. Natural and forced Convection.
f. Radiation
g. Heat Exchangers, cooling towers and chillers.
h. Overall heat-transfer co-efficient.
i. Solar Heat Gain Coefficient.
j. Logarithmic mean temperature difference.

Preq:

MECH2430 (P); MAT 1475(P)

2. MECH 3680- Principles of Refrigeration and Air Conditioning

Credit- 3 Credit, 3 class hours.

Outline-

This course covers the principles and background information about refrigeration cycle and Air-conditioning. Upon learning the theory and principles behind HVAC, students will be able to calculate adequate thermal energy related to the heating and cooling and properly size HVAC units and associated systems.

Topics Include-

a. Refrigeration Cycle
b. Psychometrics
c. Specific and Relative Humidity
d. Dew Point, Dry- Bulb and Wet Bulb Temperature
e. Air Conditioning Processes
f. Vapor Compression refrigeration
g. Vapor absorption Refrigeration

P-Req:

MECH 3580 (P/CO), MATH 1475 (P), MECH 3510 (P/CO)

3. *MECH 4780- Design and Selection of Heating and Cooling Systems*

Credit - 3 credit, 2 class hours, 2 lab hours

Outline-

This course will cover detail calculation of Heating and cooling systems, unit sizing and Ducting. Both Hand Calculation and software-based calculations will be covered in this course. Variabilities in the components of HAVC systems will also be covered. A demonstration will be provided on how those variations address the HVAC demands of residential and commercial envelopes. Participants in this course will have opportunities to take certification exams in ASHRAE CHD.

Topics covered-

a. Colling Load Calculation
b. Heating load Calculation
c. Ventilation Calculation
d. Duct Sizing
e. Components of HVAC System (Split Air Conditioning System, Variable Refrigeration System, VAV system, Ventilation system, Make up air system, Packaged Roof Top Air Conditioning System, Fan Coil Units)
f. Ductwork, System Piping, Delivery Piping

Preq:

MECH3510, MECH3680, MECH 4700 (P/CO), MATH 1575(P/CO)

4. *MECH 4880- HVAC Energy Management and Standards*

Credit - 3 Credit, 2 class hours, 2 lab hours

Outline-

This course will cover the codes and standards followed in HVAC system design, installation, and energy management. This course will cover International Standards and adoption of those standards to state and local levels. Generally, this course will cover codes and standards related to energy management and compliance in a large metropolitan area including New York City. The participants in this course will have opportunity to get LEED certification.

Topics Include-

a. Building Management System, Energy Compliance checking,
b. Energy Saving Methods (Electrification, Heat Pump Systems)
c. Energy Recovery system (CHP, Geothermal Energy, Exhaust Recirculation)
d. International Mechanical Code on Occupancy Density, Ventilation, Outdoor air
e. ASHRAE Standards
f. Adaption to State and Local Codes (NYC Mechanical Code)
g. Energy Compliance codes (IECC, NYCECC)
h. Software Applications (ComCheck)

Preq:
MECH3510 (P/CO), MECH 4780 (P)

5. ***MECH 4885- Technologies in Smart Buildings***

Credit - 3 Credit, 2 class hours, 2 lab hours

Outline:
This course covers modern technologies used in HVAC systems to convert into smart building standards and practices followed in energy systems, HVAC system design, installation, and operation. Topics covered in this course are designed to cover cost effective and comprehensive technologies that helps energy saving, automated control, decision making and health-comfort system.

Topics Include-
Internet of Things, Artificial Intelligence and Machine learning, Building Automation,

Building information Modeling, Artificial Reality, Virtual Reality, Aerial Drones.

Preq-
MECH3510 (P/CO), MECH 4780 (P)

Syllabus

MECH 3580-Advanced Thermodynamics and Heat Transfer

Credit/Contact hours: 3 Credit, 3 class hours

Instructor: TBA

Text Book: TBA/OER

Catalog Description- This course covers the applications of the laws of thermodynamics in refrigeration and HVAC system. This will also cover various modes of thermal-energy transportation in refrigeration and HVAC system.

Pre/Co-requisites: MECH 2430 (P), MATH 1475 (P)

ABET student outcomes

SO1- An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline.
SO2- An ability to design systems, components, or processes meeting specified needs for broadly defined engineering problems appropriate to the discipline;
SO3- An ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;

Weekly Schedule

Week1

Thermodynamic properties of liquids and gases

Week 2

Energy, work, power, and efficiency

Week 3

Heat Transfer fundamentals

Week4

Heat Conduction

Week 5

Insulation

Week 6

Mid Term

Week 7

Overall Heat Transfer Co-efficient; Logarithmic mean temperature difference

Week 8

Natural and Forced convection

Week 9

Radiation Heat Transfer; Solar Heat Gain Coefficient

Week 10

Heat Exchangers, Colling Tower, and Chillers

Week 11

Principle of Fluid flow

Week 12

Final

Grading System:

1. Homework-15%
2. Quiz-15%
3. Project-20%
4. Mid Term- 20%
5. Final-25%
6. Attendance-5%

Syllabus

MECH 3680- Principles of Refrigeration and Air Conditioning

Credit/Contact hours: 3 Credit, 3 class hours

Instructor: TBA

Textbook: TBA/OER

Catalog Description: This course covers the Theory and principles of refrigeration cycle and air-conditioning. Upon learning the theory and principles students will be able to calculate adequate thermal energy related to the heating and cooling and properly size HVAC units and associated systems.

Pre-requisites: MECH 3580 (P/CO) , MATH 1475 (P), MECH 3510 (P/CO)

ABET Student Outcome:
SO1. An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline.
SO3. An ability to apply written, oral, and graphical communication in broadly defined technical and non-technical environments; and an ability to identify and use appropriate technical literature.

Weekly Schedule

Week1

Psychometrics; Specific and Relative Humidity; Dew Point, Dry- Bulb and Wet Bulb Temperature

Week 2

Sensible and Latent Heat

Week 3

Heat Transfer co-efficient & Thermal Resistance

Week 4

Refrigeration and Air-Conditioning Process

Week 5

Introduction to Refrigeration Cycle

Week 6

Vapor Compression Refrigeration

Week 7

Mid Term

Week 8

Vapor absorption Refrigeration

Week 9

Methods of heating and cooling load calculation.

Week 10

Cooling Load Temperature Difference method

Week 11

Radiant Time Series Method

Week 12

Ventilation

Week 13

Infiltration

Week 14

Final

Grading System:

1. Homework-15%
2. Quiz-15%
3. Project-20%
4. Mid Term- 20%
5. Final-25%
6. Attendance-5%

Syllabus

MECH 4780- Design and Selection of Heating and Cooling Systems

Credit/Contact hours: 3 Credit, 2 class hours,2 lab hours

Instructor: TBA

Textbook: TBA/OER

Catalog Description- This course will cover detail calculation of Heating and cooling systems, unit sizing and Ducting. Both Hand-calculation and software-based calculations will be covered in this course. Variabilities in the components of HAVC systems will also be covered. A demonstration will be provided on how those variations address the HVAC demands of residential and commercial envelopes.

Pre-requisites: MECH3510, MECH3680, MECH 4700 (P/CO), MATH 1575(P/CO)

ABET Student Outcome

SO 1- An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline;

SO 2- An ability to design systems, components, or processes meeting specified needs for broadly defined engineering problems appropriate to the discipline;

SO 4- An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and

SO 5- An ability to function effectively as a member as well as a leader on technical teams.

Weekly Schedule

Week1

Hand Calculation of Heating and Cooling Load

Week2

Hand Calculation of Ventilation

Lab1- Design and calculation of a residential HVAC system

Week 3

Hand Calculation of Duct sizing

Week 4

Software Based calculation

Revit, CHVAC, Auto CAD

Lab2-Desig and calculation of a commercial HVAC system.

Week5

Understanding various HVAC Systems

Week 6

Split Air Conditioning System

Week 7 Midterm

Week8

Variable Refrigerant Flow System

Week9

Ventilation system

Week10

Make up air system

Week 11

Packaged Roof Top Air Conditioning System

Week12

Fan Coil Unit; Ductwork; System Piping; Delivery Piping
Lab3- Design and calculation of an industrial HVAC system.

Week 13 Final

Grading System:

1. Homework-15%
2. Quiz-15%
3. Lab Activities-20%
4. Mid Term- 20%
5. Final-25%
6. Attendance-5%

Syllabus

MECH 4880- HVAC Energy Management and Standards

Credit/Contact hours: 3 Credit Hours, 2 Class hours, 2 Lab Hours

Instructor: TBA

Textbook: TBA/OER

Pre-requisites: MECH3510 (P/CO), MECH 4780 (P)

Catalog Description

This course will cover the codes and standards followed in HVAC system design, installation, and energy management. This course will cover International Standards and adoption of those standards to state and local levels. Generally, this course will cover codes and standards related to energy management and compliance in a large metropolitan area including New York City. The participants in this course will have opportunity to get LEED certification.

ABET Student Outcome

SO 1- An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline;

SO 2- An ability to design systems, components, or processes meeting specified needs for broadly defined engineering problems appropriate to the discipline;

SO 4- An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and

SO 5- An ability to function effectively as a member as well as a leader on technical teams.

Weekly Schedule

Week1

International Mechanical Code

Occupancy Density
Ventilation
Outdoor air

Week2

a. ASHRAE Standards
b. Energy Compliance codes

IECC

NYCECC

Week3

Adaption to State and Local Codes

NYC Mechanical Code

Week4

Energy Compliance of HVAC equipment

Week5

Energy recovery system

Co-generation (Combined Heat and Power) system

Week 6

Mid Term

Week 7

Other forms of Energy Recovery

Geothermal Energy

Exhaust recirculation

Week 8

Software Applications (ComCheck)

Week 9 (Lab Activities)

Lab1- Energy management and compliance HVAC system for residential envelope.

Week 10

Lab2- Energy management and compliance HVAC system for commercial envelope.

Week 11

Lab3- Evaluation of energy star rating.

Week 12

Final

Grading System

1. Homework-15%
2. Quiz-15%
3. Lab Activities-20%
4. Mid Term- 20%
5. Final-25%
6. Attendance-5%

Syllabus

MECH 4885- Technologies in Smart Buildings

Credit/Contact hours: 3 Credit Hours, 2 Class hours+2 Lab Hours

Instructor: TBA

Textbook: TBA/OER

Pre-requisites: MECH 3510 (P/CO), MECH 4780 (P)

Catalog Description

This course covers modern technologies used in HVAC systems to convert into smart building standards and practices followed in energy systems, HVAC system design, installation, and operation. Topics covered in this course are designed to cover cost effective and comprehensive technologies that helps energy saving, automated control, decision making and health-comfort system.

ABET Student Outcome

SO 1- An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline;

SO 2- An ability to design systems, components, or processes meeting specified needs for broadly defined engineering problems appropriate to the discipline;

SO 4- An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and

SO 5- An ability to function effectively as a member as well as a leader on technical teams.

Weekly Schedule

Week1

Smart home concept

Week 2

Internet of Things

Week 3

Artificial Intelligence and Machine learning

Week 4

Building Management System

Lab 1- Building Automation

Week 5

Mid Term

Week 6

Building information Modeling

Lab2- Information Modeling.

Week 7

Artificial Reality

Week 8

Mid Term

Week 9

Virtual Reality

Week 10

Aerial Drones

Lab3- Technology Adoption

Week 11

Final

Grading System

1. Homework-15%
2. Quiz-15%
3. Lab Activities-20%
4. Mid Term- 20%
5. Final-25%
6. Attendance-5%

New York City College of Technology, CUNY

NEW COURSE PROPOSAL FORM

This form is used for all new course proposals. Attach this to the Curriculum Modification Proposal Form and submit as one package as per instructions. Use one New Course Proposal Form for each new course.

Course Title	Advanced Thermodynamics and Heat Transfer
Proposal Date	1/8/2024
Proposer's Name	Akm Rahman
Course Number	MECH 3580
Course Credits, Hours	3credits, 3 class hours
Course Pre / Co-Requisites	MECH 2430 (P), MATH 1475(P)
Catalog Course Description	This course will cover applications of second law of thermodynamics in refrigeration and HVAC system. This will also cover various modes of heat transfer in refrigeration and HVAC system. **Topics include in this course are** Thermodynamic Properties of liquids and gases Second Law of Thermodynamics. Energy, work, power, and efficiency Enthalpy& Entropy. Heat Transfer fundamentals Heat Conduction convection, and radiation. Conduction Natural and forced Convection, Radiation, Heat Exchangers, cooling towers and chillers Insulation, Overall heat transfer co-efficient, Solar Heat Gain Coefficient, Logarithmic mean temperature difference.
Brief Rationale Provide a concise summary of why this course is important to the department, school or college.	This course will cover engineering problems on heat transfer that are associated with HVAC systems in variable zones or envelopes. This course help students in designing and modifying HVAC systems based on advanced thermodynamic system where heat Transfer process works.
CUNY – Course Equivalencies Provide information about equivalent courses within CUNY, if any.	ME 43300-Heat Transfer at City College of New York
Intent to Submit as Common Core If this course is intended to fulfill one of the requirements in the common core, then indicate which area.	No
For Interdisciplinary Courses: - Date submitted to ID Committee for review	
- Date ID recommendation received	
- Will all sections be offered as ID? Y/N	No
Intent to Submit as a Writing Intensive Course	No

New York City College of Technology, CUNY

NEW COURSE PROPOSAL FORM

This form is used for all new course proposals. Attach this to the Curriculum Modification Proposal Form and submit as one package as per instructions. Use one New Course Proposal Form for each new course.

Course Title	Fundamentals of Refrigeration and Air Conditioning
Proposal Date	1/8/2024
Proposer's Name	Akm Rahman
Course Number	MECH 3680
Course Credits, Hours	3 credits, 3 class hours
Course Pre / Co-Requisites	MECH 3580, MATH 1475, MECH 3510 (P/CO)
Catalog Course Description	This course covers the principles and theory about refrigeration system, refrigeration cycle and Air-conditioning. Topics include- Refrigeration Cycle, Psychrometric Chart, Specific and Relative Humidity; Psychrometric Chart; Dew Point, Dry- Bulb and Wet Bulb Temperature; Air Conditioning Processes; Vapor Compression refrigeration; Vapor absorption Refrigeration.
Brief Rationale Provide a concise summary of why this course is important to the department, school or college.	This course offers principles of HVAC systems to the senior MET undergraduate students. This course will enhance the ability of the students to work in HVAC engineering and energy management in HVAC systems. This course will help open a new concentration on HVAC systems and engineering. This course will have impact in enrollment rate in MET department.
CUNY – Course Equivalencies Provide information about equivalent courses within CUNY, if any.	None
Intent to Submit as Common Core If this course is intended to fulfill one of the requirements in the common core, then indicate which area.	No
For Interdisciplinary Courses: - Date submitted to ID Committee for review	
- Date ID recommendation received	
- Will all sections be offered as ID? Y/N	No
Intent to Submit as a Writing Intensive Course	No

New York City College of Technology, CUNY

NEW COURSE PROPOSAL FORM

This form is used for all new course proposals. Attach this to the Curriculum Modification Proposal Form and submit as one package as per instructions. Use one New Course Proposal Form for each new course.

Course Title	**Design & Selection of Heating and Cooling Systems**
Proposal Date	1/8/2024
Proposer's Name	Akm Rahman
Course Number	MECH 4780
Course Credits, Hours	3credits, 2 class hours, 2 lab hours
Course Pre / Co-Requisites	MECH 3510, MECH 3680, MECH 4700 (P/CO), MATH 1575(P/CO)
Catalog Course Description	This course will cover detail calculation of Heating and cooling systems, unit sizing and Ducting. Both Hand Calculation and software-based calculations will be covered in this course. Variabilities in the components of HAVC systems will also be covered. A demonstration will be provided on how those variations address the HVAC demands of residential and commercial envelopes. Topics include- Colling Load, Heating load and Ventilation Calculation, Duct Sizing, Components of HVAC System, Energy Compliance of HVAC equipment, Energy recovery system and Software applications in design and calculation.
Brief Rationale Provide a concise summary of why this course is important to the department, school or college.	This course will follow ABET curriculum in the design and analysis of HVAC&R systems for commercial buildings, including pipe and duct design, HVAC&R equipment and system selection, building energy modeling, and economic analysis. Local MEP industries hire Mechanical engineers with knowledge/courses in HVAC system. Participants in this course will have opportunities to take certification exams in ASHRAE CHD.
CUNY – Course Equivalencies Provide information about equivalent courses within CUNY, if any.	None
Intent to Submit as Common Core	No

If this course is intended to fulfill one of the requirements in the common core, then indicate which area.	
For Interdisciplinary Courses: - Date submitted to ID Committee for review - Date ID recommendation received - Will all sections be offered as ID? Y/N	 No
Intent to Submit as a Writing Intensive Course	No

New York City College of Technology, CUNY

NEW COURSE PROPOSAL FORM

This form is used for all new course proposals. Attach this to the Curriculum Modification Proposal Form and submit as one package as per instructions. Use one New Course Proposal Form for each new course.

Course Title	HVAC Energy Management and standards
Proposal Date	1/8/2024
Proposer's Name	Akm Rahman
Course Number	MECH 4880
Course Credits, Hours	3 credits, 2 class hours, 2 lab hours
Course Pre / Co-Requisites	MECH 3510 (P/CO), MECH 4780 (P)
Catalog Course Description	This course will cover the codes and standards followed in HVAC system design, installation, and energy management. This course will cover International Standards and adoption of those standards to state and local levels. Generally, this course will cover codes and standards related to energy management and compliance in a large metropolitan area including New York City. The participants in this course will have opportunity to get LEED certification.
Brief Rationale Provide a concise summary of why this course is important to the department, school or college.	This course will help students identify the best fit of HVAC Mechanical systems into practice energy management and compliance through local and national guidelines. This course will follow ABET program criteria in project management and installation HVAC&R systems with local standards. Local MEP industries hire Mechanical engineers with knowledge/courses in contemporary codes and standards in HVAC system. The participants in this course will have opportunity to get LEED certification.
CUNY – Course Equivalencies Provide information about equivalent courses within CUNY, if any.	None
Intent to Submit as Common Core If this course is intended to fulfill one of the requirements in the common core, then indicate which area.	No
For Interdisciplinary Courses: - Date submitted to ID Committee for review	
- Date ID recommendation received	
- Will all sections be offered as ID? Y/N	Yes
Intent to Submit as a Writing Intensive Course	Yes

New York City College of Technology, CUNY

NEW COURSE PROPOSAL FORM

This form is used for all new course proposals. Attach this to the Curriculum Modification Proposal Form and submit as one package as per instructions. Use one New Course Proposal Form for each new course.

Course Title	Technologies in Smart Buildings
Proposal Date	1/8/2024
Proposer's Name	Akm Rahman
Course Number	MECH 4885
Course Credits, Hours	3 credits, 2 class hours, 2 lab hours
Course Pre / Co-Requisites	MECH 3510 (P/CO), MECH 4780 (P)
Catalog Course Description	This course covers modern technologies used in HVAC systems to convert into smart building standards and practices followed in energy systems, HVAC system design, installation, and operation. Topics covered in this course are designed to cover cost effective and comprehensive technologies that helps energy saving, automated control, decision making and health-comfort system.
Brief Rationale Provide a concise summary of why this course is important to the department, school or college.	This course will help students understanding the implementation of automation and robotics technology to convert traditional HVAC into smart system.
CUNY – Course Equivalencies Provide information about equivalent courses within CUNY, if any.	None
Intent to Submit as Common Core If this course is intended to fulfill one of the requirements in the common core, then indicate which area.	No
For Interdisciplinary Courses: - Date submitted to ID Committee for review	
- Date ID recommendation received	
- Will all sections be offered as ID? Y/N	Yes
Intent to Submit as a Writing Intensive Course	No

Meeting Minutes

Minute of the Curriculum Committee meeting on October 25, 2023

Meeting Date: 10/25/2023

Minutes of Curriculum Meeting

Attendees- Sidi Berri; Masa Nakamura; Malek Brahimi; Dominic Martinez; Zayed Saleh; Akm Rahman; Ozlem Yasar.

Absent: Angran Xiao; Andy Zhang

Meeting started at- 1:10 pm

1. Rahman Presented HVAC Proposal draft. He suggested the title of the proposal as '**HVAC Concentration in the BTech of Mechanical Engineering Technology**'.
2. Malek suggested to include student outcomes on the lab activities
3. Masa Nakamura suggested to included 15- week schedule for each course.
4. Masa also suggested not to mention program change, rather mention concentration
5. Malek raised some challenges about meeting the deadlines of ABET related activities. He mentioned that data collection cycles should be completed by this semester.
6. Rahman called for a vote on the concentration proposal. The Voting results are as follows-

Committee Members	Yes	No	Abstain
Akm Rahman, Malek Brahimi, Sidi Berri, Angran Xiao, Andy Zhang, Masa Nakamura, Ozlem Yasar, Dominic Martinez, Zayed Saleh	9	0	0

   The committee anonymously voted in favor of submitting the concentration proposal to the curriculum committee.
7. Curriculum Committee Voting results.
8. Meeting adjourned at 1:50 pm.

Minutes of the Industry Advisory meeting on May 10, 2023
Date- 5-10-2023

Industry advisory board meeting as per ABET guideline

Attendees- (11 in person) Masa Nakamura, Malek Brahimi, Andy Zhang, Angran Xiao, Dominic Martinez, Akm Rahman, Nathan Vaisman,

+10 online
Meeting started at 5pm

5.05 Pm -5.25 Pm- The attendees introduced themselves.

5:25-5:35 pm

1. Dr. Angran presented Program educational objectives for AAS and BTECH program.

2. Mr. Ed Cook insisted that PEOs of courses do not give any assurance on job search. He suggested that PEOs should address the capacity building for the students to find suitable jobs.

5.35-5.50 pm

3. Akm Rahman presented the rationale and proposal for HVAC concentration. He presented the relevance of this concentration with the current and future demand for HVAC engineer and Technologist. Rahman also presented proposal for 4 new courses under this new concentration.

4. Gloria suggested that the proposed curriculum is highly oriented to local industry.

5. Ed Cook suggested that New York City has a big need for energy conservation and energy efficient HVAC system. He also suggested including ASHRAE membership and student club will increase the acceptance of this concentration.

6. Dr. Anisur Rahman highly appreciated the proposal for HVAC concentration. He suggested including a Building management System (BMS), energy reduction strategy, electrification and heat pump systems in the proposal. Akm Rahman pledged that sufficient actions will be taken to include the suggestions of Dr. Anisur.

5.50-6.00 pm

7. Dr. Andy Zhang mentioned ASME partnership to support a seminar at Brooklyn Navy Yard with students.

8. Andy demonstrated autonomous truck for robotics-based student competition. He also demonstrated new educational Robots purchased recently.

6.00-6.05 pm
9. Mr. Dominic showed equipment and tools in Machine shop lab V-502. Tools and capacity of the lab were appreciated by the attendees.

Meeting adjourned at 6.08 pm.

LIBRARY RESOURCES & INFORMATION LITERACY: MAJOR CURRICULUM MODIFICATION

Please complete for **all** major curriculum modifications. This information will assist the library in planning for new courses/programs.

Consult with your library faculty subject specialist (http://cityte.ch/dir) **3 weeks before the proposal deadline**.

Course proposer: please complete boxes 1-4. **Library faculty subject specialist:** please complete box 5.

1

Title of proposal HVAC Engineering Technology	**Department/Program** MET
Proposed by (include email & phone) Dr. Akm Rahman	**Expected date course(s) will be offered** 08/31/2024 **# of students #20**

2

The library cannot purchase reserve textbooks for every course at the college, nor copies for all students. Consult our website (http://cityte.ch/curriculum) for articles and ebooks for your courses, or our open educational resources (OER) guide (http://cityte.ch/oer). Have you considered using a freely-available OER or an open textbook in this course?

Yes, I am preparing OER sites for the proposed courses

3

Beyond the required course materials, are City Tech library resources sufficient for course assignments? If additional resources are needed, please provide format details (e.g. ebook, journal, DVD, etc.), full citation (author, title, publisher, edition, date), price, and product link.

Yes, City Tech Library resources are sufficient. However, I suggest procuring few course materials including- International Mechanical Code from international code council ($90), ASHRAE 90.1 (from techstreet.com) ($188 printed form) as reference in the library and online subscription.

4

Library faculty focus on strengthening students' information literacy skills in finding, critically evaluating, and ethically using information. We collaborate on developing assignments and customized instruction and research guides. When this course is offered, how do you plan to consult with the library faculty subject specialist for your area? Please elaborate.

I would like to get help on developing OER resources and access to journal articles that are not available online.

5

Library Faculty Subject Specialist Junior Tidal
Comments and Recommendations
After surveying the collection, I believe that the library is in dire need of updating the books and resources to adequately support this course. Pending course approval, as well as library funding, I strongly believe that in addition to the books that Prof. Rahman suggests, that the library purchase updated texts, electronic resources, journals, and media regarding HVAC technologies.

Date 06.12.23