NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Introduction to Programming Using C++			
Course Prefix & No.: ELET115N	**Lecture Hours: 2**	**Lab Hours**: 3	**Credit Hours**: 3
Department: Science and Engineering Technology			
Program: Electronic Engineering Technology			
Revision Date: 1/2018			

Prerequisites/ Co-requisites: Placement into college-level math.

Required Accuplacer Score:

Entrance Skills:

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:

a) The ability to read college level textbooks
b) The ability to write college level lab reports

Catalog Description:

This course introduces the fundamentals of programming and logical problem solving using object-oriented methods and C++ language. The primary objective will be to develop problem solving skills applicable in the area of computers. Students will learn I/O operations, algebraic manipulations, simple control structures and string manipulations. Use of professional programming design approaches and coding style will be used in laboratory assignments. After introduction of fundamentals of programming, an object-oriented approach will be presented and developed. Prerequisite: Placement into college-level math.

Course Competencies: Instructors will identify what is expected of students by developing learning competencies. Performance competencies focus on outcomes, results and learning.
Competencies are preceded by the statement: "Students will be able to:"

Competency (Knowledge and Skills)	Critical Thinking Level	Linked to Program Outcome(s) #
1. Understand the components of a computer system and understand basic design and problem-solving strategies using C++.	Comprehension, Application,	
2. Understand C++ datatypes, Input / Output (I/O), File I/O, expressions, and errors.	Comprehension, Application,	
3. Understand the use of functions, parameter passing and return values from functions.	Comprehension, Analysis, Application,	
4. Understand C++ control structures – if statements, loops, and conditional logic.	Comprehension, Application, Evaluation	

Course Outline: The course outline will provide a general overview of the content that will be included in the course as they relate to the competencies. The first column lists the general content and the second column will allow for subtopics that will be covered.

Content Topic	**Subtopics (a., b., etc.)**
Intro to Computers and Programming	a) Hardware and Software b) Programs and Languages c) What is in a Program d) Input, processing, and output
Into to C++	a) Cout b) #include c) Variables and Literals d) Identifiers e) Data Types f) Char and floating point g) Bool data type h) Arithmetic Operators

Expressions and Interactivity	a) Cin b) Math Expressions c) Type Conversion d) Overflow and Underflow e) Type Casting f) Formatting Output g) Formatting Input h) Debugging
Making Decisions	a) Relational Operators b) If Statements c) Flags d) If / Else Statements e) Nested Ifs f) Menus g) Checking Numerical Ranges h) Comparing Strings i) Switch Operator
Looping	a) Increment and decrement b) While loop c) Counters d) Do-while loop e) For loop f) Sentinels g) Nested Loops h) Breaking out of a loop i) Continue statement
Functions	a) Defining and calling b) Prototypes c) Sending data d) Pass by value e) Return f) Returning data from a function g) Returning a Boolean value h) Local and global variables i) Static local variables j) Overloading functions k) Exit() l) Stubs and drivers

Arrays	a) Hold Multiple Values b) Accessing elements c) Bounds checking in C++ d) Initialization e) Processing array contents f) Arrays as function arguments g) 2-d arrays h) Arrays of strings i) 3-d or more arrays
Searching and Sorting	a) Bubble sort b) Selection sort c) Ascending order d) Descending order
Pointers	a) Getting the address b) Pointer arithmetic c) Initializing d) Comparing e) As function parameters
Characters, Strings and the string class	f) Character testing g) Case conversion h) Internal storage of C-strings i) Working with C-strings j) Conversion functions k) String class
Structured Data	a) Abstract Data Types b) Accessing structured members c) Initializing d) Arrays of structures e) As function elements f) Returning a structure from a function g) Pointers to structures
Files	a) As inputs b) As outputs c) Error testing d) Radom-access files
Classes	a) Intro to Classes

Performance Evaluation: In this section please explain the different Assessment Tools that will be used to demonstrate student learning. The assessment ideally should include quantitative measures such as standardized tests, essays, locally-developed tests and if applicable, licensure exams. Qualitative measures such as portfolios of student work, written reports, oral presentations and interviews should be included as well.

Formative Assessments	**Summative Assessments**
Homework Assignments Quizzes Lab Reports	Tests Final Exam

Method of Instruction: Examples include lecture, group discussion field trip, guest speakers, individual instruction, field observation, etc.

Lecture

Homework Assignments

Lab Work

Instructional Facilities:

Lecture and Lab portions of the course are conducted in a lab equipped with C++ Compilers.

Suggested Texts:

Textbook:
Starting Out with C++: From Control Structures through Objects, Brief Edition

by Tony Gaddis

Revision History:

This course updates the pre-requisites and the Course Competences.

January 9, 2018 – The increased lab time would allow more programming practice that faculty believe is needed going forward. For example, during the fall 2017 semester, the instructor had to scale back the number of assigned programs each week. The fall 2017 course assessment completed at the end of December subsequently verified that the students needed more practice.

Will this course be taught online? Yes___No X

If yes, please complete the Online Course Outline For

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Digital Circuits I			
Course Prefix & No.: ELET121N	**Lecture Hours: 2**	**Lab Hours**: 3	**Credit Hours**: 3
Department: Science and Engineering Technology			
Program: Electronic Engineering Technology			
Revision Date: 1/2018			

Prerequisites:

Prerequisite or Co-requisite: MATH110N.

Entrance Skills:

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:
a) The ability to read college level textbooks
b) The ability to write college level lab reports

Catalog Description:

This course is a presentation of fundamental concepts in digital theory needed for more advanced study of digital circuits. The subject areas are number systems, digital codes, Boolean algebra, Karnaugh mapping techniques, basic logic gates, and flip-flops. Prerequisite or Co-requisite: MATH110N.

Course Competencies: Instructors will identify what is expected of students by developing learning competencies. Performance competencies focus on outcomes, results and learning. Competencies are preceded by the statement: "Students will be able to:"

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Convert between number systems and express signed numbers in binary signed magnitude using 1's and 2's complement form	Synthesis	
2. Understand and apply Logic Gates, Adders, Encoders, Decoders, Comparators, Multiplexers and de-multiplexers	Application, Analysis	
3. Simplify algebraic expressions using Boolean algebra, DeMorgan's theorems and Karnaugh map to simplify expressions or truth table functions	Comprehension, Application, Analysis	
4. Apply Latches and Flip-Flops and use One-shots and Multivibrators as clocking sources	Application, Comprehension, Analysis	

Course Outline: The course outline will provide a general overview of the content that will be included in the course as they relate to the competencies. The first column lists the general content and the second column will allow for subtopics that will be covered.

Introduction	a) Digital and Analog b) Waveforms c) Basic logic d) Test and Measurement instruments
Number Systems, Operations, and codes	a) Decimal b) Binary c) Conversion between the two d) Binary Math e) Complement f) Signed numbers g) Arithmetic with Signed h) Hex Numbers i) Binary coded Decimal j) Digital Codes k) Error Codes
Logic gates	a) And b) Or c) Nand d) Nor e) Xor and EXOR
Boolean Algebra and Logic Simplification	a) Boolean Algebra (BA) – Laws b) DeMorgan's Theorems c) Logic Simplification Using BA d) Standard Form e) Karnaugh Map f) SOP / POS
Combinatorial Logic	a) Basic circuits b) Implementing c) Universal Properties of NAND & NOR Gates d) Pulse wave operation

Functions of Combinatorial Logic	a) Half and Full Adders b) Parallel adders c) Ripple carry and look ahead adders d) Comparators e) Decoders f) Encoders g) Code converters h) Muxs i) Demuxs j) Parity Generators / Checkers
Latches, Flip-flops, and timers	a) Latches b) Flip Flops and applications c) One-shots d) Astable multivibrator

Performance Evaluation:

Formative Assessments	**Summative Assessments**
Homework Assignments	Unit tests
Quizzes	Final Exam
Lab Notebooks and Reports	

Method of Instruction:
Lecture
Group work
Lab work

Instructional Facilities:
Lab portion of the course is conducted in the Electronics lab

Suggested Texts:

Floyd, Digital Fundamentals, 11th Edition, Prentice Hall

Instructor Handout Notes and Technical Data Sheets

Revision History: :

Developed March 2014 (D. Marcotte)
Revised October 2017

January 9, 2018 - The additional hour would allow more lab time that faculty believe is needed going forward. For example, during the fall semester 2017, there were several labs which spilled over into the following week resulting in fewer labs during the semester. The fall 2017 course assessment completed at the end of December subsequently verified this.

Will this course be taught online? Yes____No__X_

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Circuit Analysis I			
Course Prefix & No.: ELET131N	**Lecture Hours: 3**	**Lab Hours: 3**	**Credit Hours: 4**
Department: Science and Engineering Technology			
Program: Electronic Engineering Technology			
Revision Date: 10/2017			

Prerequisites:

Prerequisite or Co-requisite: MATH110N.

Entrance Skills:

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:
a) The ability to read college level textbooks
b) The ability to write a college level lab report

Catalog Description:

This includes theory and laboratory work on DC current, voltage, resistance, Ohm's law, energy, power, series-parallel circuits, network theorems and networks. Introduction to AC current, voltage and power. Prerequisite or Co-requisite: MATH110N.

Course Competencies: Instructors will identify what is expected of students by developing learning competencies. Performance competencies focus on outcomes, results and learning. Competencies are preceded by the statement: "Students will be able to:"

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Define and solve for current, voltage, resistance, and power in series, parallel, and series-parallel electric circuits using both scientific and engineering notation	Application, Comprehend, Synthesis	
2. Calculate voltages and currents using Ohm's law, Kirchhoff's voltage and current laws as well as voltage and current divider equations	Comprehend, Evaluation	
3. Calculate electrical quantities using the branch-current, mesh current, and nodal voltage analysis methods	Comprehend, Application, Evaluation	
4. Solve complex circuits by applying Superposition, Thevenin's, Norton's, and Maximum Power Transfer theorems	Comprehend, Evaluation	

Course Outline: The course outline will provide a general overview of the content that will be included in the course as they relate to the competencies. The first column lists the general content and the second column will allow for subtopics that will be covered.

Content Topic	**Subtopics (a., b., etc.)**

Performance Evaluation: In this section please explain the different Assessment Tools that will be used to demonstrate student learning.

Formative Assessments	**Summative Assessments**
Homework Assignments	Unit Tests
Quizzes	Final Exam
Lab Notebooks and Reports	

Method of Instruction: Examples include lecture, group discussion field trip, guest speakers, individual instruction, field observation, etc.

Lecture

Group Work

Lab Work

Instructional Facilities: List the type of classroom and any special facilities which may be required such as audiovisual, maps, lab facilities, etc. Also list any suggested texts.

Lab portion of the course is conducted in the Electronics lab.

Suggested Texts:

Revision History:

Developed March 2014 (D. Marcotte)
Revised October 2017

Will this course be taught online? Yes____No___X_

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Circuit Analysis II			
Course Prefix & No.: ELET132N	**Lecture Hours: 3**	**Lab Hours: 3**	**Credit Hours: 4**
Department: Science and Engineering Technology			
Program: Electronic Engineering Technology			
Revision Date: 10/2017			

Prerequisites:

Prerequisite or Co-requisite: ELET131N Co-Req: MATH120N

Entrance Skills:

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:
a) The ability to read college level textbooks
b) The ability to write a college level lab report

Catalog Description:

Theory and laboratory work on AC current, voltage, impedance, power, series-parallel circuits, network theorems and networks. Theory and laboratory work on magnetism and magnetic circuits, resonant circuits, transformers, and filters. Prerequisite: ELET131N and MATH110N; Corequisite: MATH120N (or permission of the Program Coordinator).

Course Competencies: Instructors will identify what is expected of students by developing learning competencies. Performance competencies focus on outcomes, results and learning. Competencies are preceded by the statement: "Students will be able to:"

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Determine transient (time-varying) responses of capacitive and inductive networks and plot resulting voltages and currents.	Comprehension, Analysis, Application	
2. Determine the phase relationship between two sinusoidal waveforms and understand how to calculate the average and effective values of any waveform and using phasor format to add and subtract sinusoidal waveforms.	Comprehension, Analysis,	
3. Find the total impedance of series, parallel and series-parallel ac circuits and become proficient in applying Thevenin's and Norton's theorem to ac networks.	Comprehension, Analysis, Application	
4. Develop confidence in the use of logarithms and decibels to define levels and also become familiar with frequency response of filters and display these using Bode Plots.	Knowledge, Comprehension, Analysis, Application	

Course Outline: The course outline will provide a general overview of the content that will be included in the course as they relate to the competencies. The first column lists the general content and the second column will allow for subtopics that will be covered.

Content Topic	**Subtopics (a., b., etc.)**

Performance Evaluation: In this section please explain the different Assessment Tools that will be used to demonstrate student learning.

Formative Assessments	**Summative Assessments**
Homework Assignments	Unit Tests
Quizzes	Final Exam
Lab Notebooks and Reports	

Method of Instruction: Examples include lecture, group discussion field trip, guest speakers, individual instruction, field observation, etc.
Lecture
Group Work
Lab Work

Instructional Facilities: List the type of classroom and any special facilities which may be required such as audiovisual, maps, lab facilities, etc. Also list any suggested texts.

Lab portion of the course is conducted in the Electronics lab.

Suggested Texts: **Robert L. Boylestad**, Introductory Circuit Analysis, 13th Edition, 2016
ISBN-13: 9780133923605

Revision History:

Developed March 2014 (D. Marcotte)
Revised October 2017

Will this course be taught online? Yes____No___X_

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Electronics I			
Course Prefix & No.: ELET141N	**Lecture Hours: 3**	**Lab Hours: 3**	**Credit Hours: 4**
Department: Science and Engineering Technology			
Program: Electronic Engineering Technology			
Revision Date: 10/2017			

Prerequisite:
Successful completion (with a grade of C- or better) of
ELET131N Circuit Analysis I

Co-requisite:

MATH120N Pre-Calculus

Entrance Skills:

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:
a) The ability to read college level textbooks
b) The ability to write college level lab reports

Catalog Description:

This is a study of the physical behavior of electronic devices. Emphasis is on analysis and application of electronic circuits utilizing semiconductor diodes, bipolar transistors, and field effect transistors. Topics covered include rectification, clipping and clamping circuits, regulated power supplies, basic circuits, biasing of transistors, and simplified AC modeling of transistor circuits. Simulation tools are used to reinforce the theory. Laboratory experimentation reinforces classroom theory with practical work.

Prerequisites: ELET131, co-requisite MATH120

Course Competencies: Instructors will identify what is expected of students by developing learning competencies. Performance competencies focus on outcomes, results and learning. Competencies are preceded by the statement: "Students will be able to:"

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Define semiconductor principles and construct DC load lines and operating points for diodes, bipolar junction transistors (BJT's) and Field Effect Transistors (FET's).	Knowledge, Comprehension, Application	
2. Identify and analyze half-wave and full-wave rectifier circuits as well as clippers, clampers, peak detectors and voltage multipliers.	Comprehension, Analysis	
3. Discuss the operation of the BJT and the FET including biasing them in various configurations and identifying saturation and cut-off points for a given bias.	Comprehension, Application, Analysis	
4. Design BJT and FET amplifier networks and use decibels and Bode Plots to understand their Frequency Response.	Application, Analysis, Comprehension	

Course Outline:

I. Diodes	a. Solid State Physics b. Atomic Structure of Silicon, Germanium and GaAs c. Diode notations and symbols d. Forward and Reverse Bias e. Diode Testing f. LEDs g. Zener diodes h. Transformers and Rectification i. Power Supplies j. Other Diode Applications k. Special Purpose Diodes
II. Bipolar Junction Transistors (BJT)	a. Transistor configurations b. Voltage Amplification c. BJTs as switches d. Bias circuits e. Voltage and current source circuits f. Feedback g. BJT Amplifiers (CC, CE and CB) h. BJT AC Analysis i. Power amplifiers and feedback j. BJT Modeling k. Cascaded systems
III. Field Effect Transistors (FET)	a. Types of FETs b. FET biasing c. FET Amplifiers d. Amplifier Networks e. BJT and FET Frequency Response

Performance Evaluation:

Formative Assessments	Summative Assessments
Homework Assignments	Unit Tests
Quizzes	Final Exam
Lab Notebooks and Reports	

Method of Instruction: Examples include lecture, group discussion field trip, guest speakers, individual instruction, field observation, etc.

Lecture

Group Work

Lab Work

Instructional Facilities:

Lab portion of the course is conducted in the Electronics lab

Suggested Texts:
Electronic principles/Albert Malvino, David J. Bates. - Eighth edition: McGraw Hill Education., 2013.
ISBN: 978-0-07-337388-1

Revision History:

Developed October 2017 (D. Marcotte)

Will this course be taught online? Yes____No_X__

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Advanced Digital Circuits			
Course Prefix & No.: ELET221N	**Lecture Hours: 3**	**Lab Hours: 3**	**Credit Hours: 4**
Department: Science and Engineering Technology			
Program: Electronic Engineering Technology			
Revision Date 10/2017			

Prerequisites:

Successful completion (with a grade of C- or better) of
MATH120 Pre-Calculus
ELET121 Digital Circuits

Entrance Skills:

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:
a) The ability to read college level textbooks
b) The ability to write a college level lab report

Catalog Description:

Advanced topics in digital electronics are covered in this course. These topics include the internal structure of logic families, complex digital circuits, Flip-Flop operations, applications, counter designs using state machine, state diagrams, K-Maps, shift registers and memory devices. A/D and D/A conversion, timing diagrams, computer bus systems, and complex circuit debugging are also included. The topic of digital interfacing is also covered. This includes interfacing various logic families to each other as well as interfacing logic to various I/O loads, such as inductive loads and 120VAC loads. Theory and laboratory work on advanced concepts in digital circuit design will be covered.

(Prerequisites: MATH120, ELET121)

Course Competencies: Instructors will identify what is expected of students by developing learning competencies. Performance competencies focus on outcomes, results and learning. Competencies are preceded by the statement: "Students will be able to:"

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Understand synchronous and asynchronous circuits by implementing various types of shift register (SR) circuits and using state machines and state diagrams to implement and apply circuits to real world applications.	Application, Comprehend, Synthesis	
2. Understand memory basics including the various types of memory devices such as RAM, ROM, Flash, etc.	Comprehend, Evaluation	
3. Be able to design basic programmable devices such as CPLD's and FPGAs in a real-world application.	Comprehend, Application, Evaluation	
4. Be able to discuss the computer bus basics including the different types (parallel, serial, USB, etc).	Comprehend, Evaluation	

Course Outline: The course outline will provide a general overview of the content that will be included in the course as they relate to the competencies. The first column lists the general content and the second column will allow for subtopics that will be covered.

Content Topic	**Subtopics (a., b., etc.)**
I. Latches, Flip-Flops and Timers	a. Latches b. Edge triggered Flip-Flops

	c. Flip-Flop Operating Characteristics d. Flip-Flop Applications e. One-Shots f. Astable Multivibrator
II. Counters	a. Asynchronous Counters b. Synchronous Counters c. Up/Down Counters d. Design of Synchronous Counters e. Cascaded Counters f. Counter Decoding g. Counter Applications
III. Shift Registers	a. Operations b. Serial In/Parallel Out c. Serial In/Serial Out d. Parallel In/Parallel Out e. Parallel In/ Serial Out f. Bi-Directional SR g. SR Counters h. SR Applications
IV. Memory and Storage	a. Memory Basics b. RAM c. ROM d. Programmable ROM e. Flash f. Memory Expansion g. Magnetic and Optical Storage
V. Signal Interfacing	a. Converting Analog Signals to Digital b. Analog-to-Digital Conversion Methods c. Digital-to- Analog Conversion Methods
VI. Computer Concepts	a. The Basic Computer b. Bus Standards c. Basic Operation d. Internal Interfacing

Performance Evaluation: In this section please explain the different Assessment Tools that will be used to demonstrate student learning.

Formative Assessments	Summative Assessments
Homework Assignments	Unit Tests
Quizzes	Final Exam
Lab Notebooks and Reports	

Method of Instruction: Examples include lecture, group discussion field trip, guest speakers, individual instruction, field observation, etc.

Lecture

Group Work

Lab Work

Instructional Facilities: List the type of classroom and any special facilities which may be required such as audiovisual, maps, lab facilities, etc. Also list any suggested texts.

Lab portion of the course is conducted in the Electronics lab.

Suggested Texts:
Floyd, Digital Fundamentals, 11th Edition, Prentice Hall

Instructor Handout Notes and Technical Data Sheets

Revision History:

Developed March 2014 (D. Marcotte)
Revised October 2017

Will this course be taught online? Yes____No___X_

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Electronics II			
Course Prefix & No.: ELET241N	**Lecture Hours: 3**	**Lab Hours**: 3	**Credit Hours**: 4
Department: Science and Engineering Technology			
Program: Electronic Engineering Technology			
Revision Date: 10/2017			

Prerequisites:
Successful completion (with a grade of C- or better) of
ELET141 Electronics I,
ELET132 Circuit Analysis II and
MATH120 Pre-Calculus.

Entrance Skills:

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:
a) The ability to read college level textbooks
b) The ability to write college level lab reports

Catalog Description:

This course is a continuation of Electronics I covering more advanced electronics topics with a variety of applications. Emphasis is on analysis and application of operational amplifiers. The non-ideal characteristics of op-amps and other electronic devices will be discussed with applications emphasizing offset, gain and linearity. Other topics may include but are not limited to: differential amplifiers, frequency response, A/D and D/A circuits, active filters, troubleshooting of lab test circuits and analysis using computer electronic analysis simulation.

(Prerequisites: ELET141, ELET132, MATH120 or permission of the EET Program Coordinator)

Course Competencies: Instructors will identify what is expected of students by developing learning competencies. Performance competencies focus on outcomes, results and learning. Competencies are preceded by the statement: "Students will be able to:"

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Understand logarithms, decibels, Bode Plots and Miller Effect Capacitance	Synthesis	
2. Be able to calculate Frequency Response for BJT and FET Amplifiers as well as Op-Amps	Application, Analysis	
3. Show how the single-ended output voltage of an Op-Amp depends on its open-loop gain and differential input voltage.	Comprehension, Application, Analysis	
4. Work with differential, instrumentation and bridge amplifiers and calculate the effects for AC performance, bandwidth, slew rate and noise.	Application, Comprehension, Analysis	

Course Outline: The course outline will provide a general overview of the content that will be included in the course as they relate to the competencies. The first column lists the general content and the second column will allow for subtopics that will be covered.

FET Amplifiers	a. P-Channel vs. N-Channel b. Common-Gate c. Source Followers
BJT and FET Frequency Analysis	a. Frequency Responses b. Logs, Decimals and Bode Plots

Operational Amplifiers & Applications	a. Op-Amp Definitions and Specs b. Differential and common mode operation c. Applications – summing, instrumentation and active filters
Power Amplifiers	a. Class A, B, C and D operations b. Series fed Class A amplifier
Linear Digital ICs	a. Comparators b. D/A Converters c. VCOs d. Phase-Lock Loops
Feedback and Oscillator Circuits	a. Various circuits b. Wein-Bridge circuits c. Tuned oscillator circuits
Power Supplies and Voltage Regulators	a. Power supplies b. Voltage regulators c. IC Voltage regulators and applications d. Other 2-terminal devices

Performance Evaluation:

Formative Assessments	**Summative Assessments**
Homework Assignments	Unit tests
Quizzes	Final Exam
Lab Notebooks and Reports	

Method of Instruction:

Lecture

Group work

Lab work

Instructional Facilities:
Lab portion of the course is conducted in the Electronics lab

Suggested Texts:
Robert L. Boylestad / Louis Nashelsky, "Electronic Devices and Circuit Theory" Upper Saddle River, NJ: Pearson Education, Inc., 2013. ISBN: 978-0-13-262226-4, Eleventh Edition.

Boylestad/Nashelsky/Monssen, Laboratory Manual to accompany "Electronic Devices and Circuit Theory", 2013 ISBN: 978-0-13-262245-5, Eleventh Edition.

Revision History: :

Developed March 2014 (D. Marcotte)
Revised October 2017

Will this course be taught online? Yes____No__X_

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Communications Theory			
Course Prefix & No.: ELET245N	**Lecture Hours: 2**	**Lab Hours**: 2	**Credit Hours**: 3
Department: Science and Engineering Technology			
Program: Electronic Engineering Technology			
Revision Fate: 12/2017			

Prerequisites:

Successful completion (with a grade of C- or better) of
ELET241N Electronics II,
MATH210N Calculus I.

Entrance Skills:

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:
a) The ability to read college level textbooks
b) The ability to write college level lab reports

Catalog Description:

Study of principles of radio frequency communication, modulation systems, pulse, digital modulation circuits, transmission line and propagation. This course is offered in the evening only.

(Prerequisites: ELET241N, MATH210N or permission of the EET Program Coordinator)

Course Competencies: Instructors will identify what is expected of students by developing learning competencies. Performance competencies focus on outcomes, results and learning. Competencies are preceded by the statement: "Students will be able to:"

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Understand the basics of Electronic Communications and Digital Communications.	Comprehension, Analysis, Synthesis	
2. Explain the fundamentals of Amplitude Modulation (AM), Frequency Modulation (FM) and know the differences between time division multiplexing, frequency division multiplexing and digital modulation.	Application, Evaluation, Comprehension,	
3. Explain the basics of transmission line theory and perform communication circuit analysis using computer simulations.	Application, Analysis, Evaluation	
4. Understand principles of Data Communications.	Application, Comprehension, Analysis	

Course Outline: The course outline will provide a general overview of the content that will be included in the course as they relate to the competencies. The first column lists the general content and the second column will allow for subtopics that will be covered.

Introduction to Electronic Communications	
Electronics review with intro to FFT analysis	

Amplitude Modulation (AM)	
Frequency Modulation (FM)	
Digital Communications	
Phase Locked Loops (PLL)	
Multiplexing and de-multiplexing communications channels	
Digital Data Transmission	
Communications Networks	
Transmission Lines	

Performance Evaluation:

Formative Assessments	**Summative Assessments**
Homework Assignments Quizzes Lab Reports	Unit tests Final Exam

Method of Instruction:
Lecture Group work Lab work

Instructional Facilities:

Lab portion of the course is conducted in the Electronics lab

Suggested Texts:

Textbook: Frenzel, Principle of Electronic Comm Systems, 4th Edition, 2015

Revision History: :

Developed March 2014 (D. Marcotte)

Revised December 2017

Will this course be taught online? Yes____No__X_

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: Microcontrollers			
Course Prefix & No.: ELET250N	**Lecture Hours: 3**	**Lab Hours: 3**	**Credit Hours: 4**
Department: Science and Engineering Technology			
Program: Electronic Engineering Technology			
Revision Date: 10/2017			

Prerequisites:

ELET121N and ELET115N or CSCI175N

Entrance Skills:

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:
a) The ability to read college level textbooks
b) The ability to write a college level lab report

Catalog Description:
Today's computers fall into two categories. The first uses high performance microprocessors such as the Intel Pentium Class of Processors. The second category focuses on issues of space, cost, low power and fast development in products such as wireless phones, automobiles, security systems, and appliances. These lower performance processors are called Microcontrollers and are merely a lower power version of the larger microprocessors. The principles of operation are the same. This course focuses on this second category and the Hardware and Software design of these Microcontrollers. Prerequisites: CSCI175N or ELET115N and ELET141N.

Course Competencies: Instructors will identify what is expected of students by developing learning competencies. Performance competencies focus on outcomes, results and learning. Competencies are preceded by the statement: "Students will be able to:"

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Analyze the Hardware and Software Architectures of the Intel Family of Embedded Microprocessors.	Comprehension, Analysis,	
2. understand and interpret coding schemes, such as Assembly Language Fundamentals, including looping, calls, and procedures and the differences between microcontrollers and microprocessors	Comprehension, Evaluation	
3. interface the on-board ROM, RAM, registers, timers, counters, serial port, and general purpose I/O to digital, analog, and time-varying input and output signals	Application	
4. Apply microcontroller principles to real world situations. This includes develop real-time assembly language programs using linear, polling, handshaking, and interrupt techniques.	Application	

Course Outline: The course outline will provide a general overview of the content that will be included in the course as they relate to the competencies. The first column lists the general content and the second column will allow for subtopics that will be covered.

Content Topic	**Subtopics (a., b., etc.)**

Performance Evaluation: In this section please explain the different Assessment Tools that will be used to demonstrate student learning.

Formative Assessments	**Summative Assessments**
Homework Assignments	Unit Tests
Quizzes	Final Exam
Lab Notebooks and Reports	

Method of Instruction: Examples include lecture, group discussion field trip, guest speakers, individual instruction, field observation, etc.

Lecture
Group Work
Lab Work

Instructional Facilities: List the type of classroom and any special facilities which may be required such as audiovisual, maps, lab facilities, etc. Also list any suggested texts.

Lab portion of the course is conducted in the Electronics lab.

Suggested Texts: "the 8051 microcontroller, a system's approach"
By Mazidi, Mazidi and McKinlay.
ISBN 13: 978-0-13-508044-3
Pearson

Revision History:

Developed March 2014 (D. Marcotte)
Revised October 2017

Will this course be taught online? Yes____No___X_

If yes, please complete the Online Course Outline Form.

NASHUA COMMUNITY COLLEGE

COURSE OUTLINE FORM

Course Title: EET Capstone Project			
Course Prefix & No.: ELET274N	**Lecture Hours: 1**	**Lab Hours**: **3**	**Credit Hours**: **2**
Department: Science and Engineering Technology			
Program: Electronic Engineering Technology			
Revision Date: 12/2017			

Prerequisites:

Prerequisite or Co-requisite:

ELET132N – Circuit Analysis II
ELET250N – Microcontrollers

Entrance Skills:

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:
a) The ability to read college level textbooks
b) The ability to write a college level lab report

Catalog Description:

An independent lab project using the student's knowledge of digital/analog electronic circuits and microprocessors. Students will design and build a working model of their selected project. The project will be built, troubleshot and demonstrated by the end of the semester. This course is offered in the evening only. Prerequisites: ELET132N, ELET250N.

Course Competencies: Instructors will identify what is expected of students by developing learning competencies. Performance competencies focus on outcomes, results and learning. Competencies are preceded by the statement: "Students will be able to:"

Competency (Knowledge and Skills) Students will be able to:	**Critical Thinking Level**	**Linked to Program Outcome(s) #**
1. Create a Project Plan which includes but is not limited to: the project proposal, circuit design, simulation, test plans, bill of materials, flowcharts and software code (where applicable), and demonstration of a working prototype.	Knowledge, Comprehension, Application	
2. Create a project test evaluation plan to assure the project works as initially specified.	Application, Analysis, Comprehension	
3. Apply formal communication skills with client / customer (if applicable), instructor, teammates in both oral and written form. This includes but is not limited to regular status reports and formal public presentation.	Comprehension, Application, Analysis, Evaluation	
4. Demonstrate teamwork which includes professional, ethical, and social responsibilities	Comprehension, Analysis, Evaluation	

Course Outline: The course outline will provide a general overview of the content that will be included in the course as they relate to the competencies. The first column lists the general content and the second column will allow for subtopics that will be covered.

Content Topic	**Subtopics (a., b., etc.)**
Schedule	• Initial Circuit Design (+BOM) • 2nd round of CD & SW Flowcharts (if applicable), and simulation • Project Design Test Plans • Demonstration of Working Project
Testing	• Initial Project Test Plans (created before final project completed) • Initial Project Evaluated • Based on initial Evaluation, revise the Test plans • Final Test and revised Plan
Communications	• Informal oral communications to customers, instructor, teammates. • Deliver formal communications in the form of PowerPoint as well as demonstration and description of project. • Written Reports: ongoing status reports and a final project paper
Teamwork, Ethical and Social Responsibilities	• Demonstrate teamwork in the class. • Understand Engineering Codes of Conduct and Codes of Ethics.

Performance Evaluation: In this section please explain the different Assessment Tools that will be used to demonstrate student learning.

Formative Assessments	**Summative Assessments**
Periodic Status Reports: uploaded to Canvas. Quizzes	Final Oral Presentation Final Project Technical Report

Method of Instruction: Examples include lecture, group discussion field trip, guest speakers, individual instruction, field observation, etc.

Lecture

Group Work

Lab Work

Instructional Facilities: List the type of classroom and any special facilities which may be required such as audiovisual, maps, lab facilities, etc. Also list any suggested texts.

Lab portion of the course is conducted in the Electronics lab.

Suggested Texts: **No text**

Revision History:

Developed March 2014 (D. Marcotte)

Revised December 2017

Will this course be taught online? Yes____No___X_

If yes, please complete the Online Course Outline Form.