SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 100: Introduction to Engineering Technology

Course Description: Credit 3 hours. Introduction to a broad range of engineering technology topics and fields, such as mechanical design, engineering materials, machining, computers and programming, data analysis and graphing, robotics, and communications, discussion includes the roles, duties, responsibilities, professional ethics, professionalism, fundamental skills and knowledge required of engineering technologists. (Fall, Spring)

Pre-requisite courses: None

Minimum Topics Covered:

- Technology as a career.
- Professional ethics.
- Unit systems and conversions.
- Basic physics concepts.
- Using Microsoft Excel.
- Statistical concepts.
- Graphical representation and interpretation.

Pre-requisite Topics:

- Basic Algebra (High School Math)

Objectives and Outcomes:

Students will be able to:

- Understand the engineering technology career.
- Differentiate between different fields of engineering/technology.
- Understand the roles, duties, responsibilities and fundamental skills required for technologists.
- Gain awareness of the importance of professional ethics and professionalism.
- Get exposed to written and oral technical communications on topics related to engineering technology.
- Get familiar with the major tools and techniques utilized by engineers.
- Understand main statistical concepts.
- Generate and interpret proper graphs.

Relevance to Job Market:

This class help students to understand the difference between disciplines of engineering technology to allow them to properly select future career. The course also provides the students with the knowledge of the engineering technology curriculum. Moreover, the course prepare the students for higher level courses on in the program.

Relevance to Program Learning Outcomes and Evaluation:

SO3	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
Justification: Class assignments and activities allow students to use basic mathematics and the knowledge covered in class to work on simple technology problems. Student also generate spreadsheets and graphs representing technical relationships and real-life situations.	
Measured by: Assignments, quizzes, in-class activities, tests.	
SO5	An ability to function effectively as a member or leader on a technical team
Justification: In-class activates require student to work in groups to analyze technical problems and propose solutions for them.	
Measured by: In-class assignments and activities.	

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Course Specifications Sheet
Spring 2019

Course Number and name: ET 111: Engineering Graphics

Course Description: Credit 3 hours. Study of terminology, concepts, theories, and fundamental skills necessary to understand and operate a CAD system, and specifically using the system to graphically communicate through the basic elements of drafting including orthographic projection, sectioning, dimensioning, isometric and oblique pictorial representation, standard symbols, simple auxiliary views, precision, and tolerancing. Two hours of lecture and two hours of laboratory a week.

Pre-requisite courses: none

Minimum Topics Covered:

- Spatial Orientation – Isometric, Orthographic, Perspective, Trimetric, etc.
- Drawing Techniques – sketching, hand drawings, board drafting, 2d and 3D CAD software,
- Technical Drawing Development – Become familiar with common symbols, Scaling, Organizing, and creating takeoffs
- AutoCAD tooling – Drawing and Modifying toolbars, View Ports, Annotations, Hatching Dimensioning – ADDA standards
- Cross Section drawings and detailing
- Blueprint reading

Pre-requisite Topics:

- None

Objectives and Outcomes:

Students will be able to:

- To develop students' problem-solving and research skills required for handling materials, computing systems, and computer aided design for the industrial world.
- To develop student understanding of industrial processes and how to read and convey these processes into 2 dimensional drawings.
- Upon completion of the course, students will be able to recognize and understand different spatial orientations associated with two dimensional and three-dimensional design.
- Upon completion of the course, students will understand the purpose and function of Orthographic and Isometric drawings.
- Upon completion of the course, students will be able to name basic tools and processes used in multiple CAD systems.
- Upon completion of the course, students will be familiar with CAD products. Specifically, AutoDesck and Solidwork interfaces.
- Upon completion of the course, students will be able to understand and draw specific engineering drawings quickly and efficiently. Engineering drawing such as; sectional cuts, assemblies, rebar layouts, and technical illustrations.

- Upon completion of the course, students will be able to create professional drafting plans that are neat, organized, accurate, and professional.

Relevance to Job Market:

This class teaches students fundamentals of creating professional engineering drawings such as; technical illustrations, assembly drawings in both 2D and 3D, exploded views in both isometric and orthographic depictions, and various other drawing practices crucial to a manufacturing world. Student's get hands on experience with AutoCAD and SolidWorks, 2 of the industry leading software platforms for 2D and 3D modeling used in engineering firms around the world. Students also learn how to create professional portfolios that are needing when developing and communicating ideas for new prototypes.

Relevance to Program Learning Outcomes and Evaluation:

SO2	Uses appropriate methods and/or software to design components and systems. Uses evidence-based approach to validate design and analysis.
Justification: Class assignments require students to design virtual models of common manufacturing products, such as, hinges, ball bearings, and pulleys that preform a desired task. Then, student are asked to adapt those products to a real world application.	
Measured by: Graded on ingenuity, professionalize, and functionality	
SO3	Writes reports and applies proper guidelines. Communicates confidently and professionally in front of audience. Uses technology and modern techniques to communicate technical information.
Justification: Class assignments require students to work in groups to accomplish a given goal. Students must record each member's daily task and organize the work in a activity log to be turned into the instructor, on Moodle, at the end of each day.	
Measured by: Graded on professionalize, organization, and completion of the task	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET 132: Construction Materials and Methods

Course Description: Credit 3 hours. A study of the behaviors and performance of building materials and assemblies, as well as construction standards and constraints.

Emphasis is placed on the understanding of the advanced engineering aspects of specific materials

and assemblies used in commercial and industrial structures. Two hours of lecture and two hours of laboratory per week. A laboratory fee is required for this course. (Fall)

Pre-requisite courses: None

Minimum Topics Covered:

- Introduction to Construction Principles
- Site Work
- Concrete
- Masonry
- Metals
- Woods and Plastics

Pre-requisite Topics: None

Course Objectives:

- Become familiar with the fundamentals of how materials are used in the process of construction.
- Discuss industry standards, in materials production, design, testing and workmanship.
- Develop a knowledge of industry coed and requirements for construction

Relevance to Program Learning Outcomes and Evaluation:

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;

1.1 Uses appropriate tools to collect and analyze data
1.2 Follows scientific approach to solve broadly defined engineering problems

Justification: Lab assignment require the student to use the tools in the lab to construct a project. Such tools are Table saw, Nail gun, Reciprocating saw ect.

Measured by: Class work completed, reports and test

SO 3 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

3.1 Writes reports and applies proper guidelines (cover page, introduction, method, results, analysis, uses complete and grammatically correct sentences)
3.2 Communicates confidently and professionally in front of audience (proper appearance, faces the audience, responds to audience questions)
3.3 Uses technology and modern techniques to communicate technical information (Moodle, Power-points, computers, projectors, charts, tables, illustrations)

Justification: Students are given a construction tool to write a report on and then give an oral presentation to the class.

Measured: The reports and oral presentation are graded for this assignment.

SO 5 **A**n ability to function effectively as a member or leader on a technical team.

5.1 Demonstrate traits conducive to team work (punctuality, flexibility, respectfulness)
5.2 Recognizes participant roles in a team setting and fulfills appropriate roles to ensure team success.

Justification: The assigned project is broken down into group activities, were a group of three or more student are assigned
An activity to complete, in this group the student rotate from the foreman's position to the worker so that each student understands
What each aspect of a construction project is about.

Measured: This is a subjective observation that the instructor does while the project is going on an student are graded on involvement.

Relevance to the Job Market:

The understanding of the tools and methods used in the construction industry are a key element to getting a job in the construction field.

The knowledge of this help both the student and future employer in that they know the field of construction.

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 202: Computer Applications

Course Description: Credit 3 hours. Introduction to the MATLAB programming environment including data types, graphics, functions, inputs/outputs, text processing, plotting functions, reading and writing data files, and case studies using MATLAB (Spring, Summer, Fall)

Pre-requisite courses: MATH 175: Pre-Calculus with Trigonometry

Minimum Topics Covered:

- Basics of MATLAB
- Array Operations
- Matrix Operations
- Functions and Files
- Programming: Basics, Conditions, Loops, Debugging
- Plotting
- Data Fitting

Pre-requisite Topics:

- Pre-Calculus (MATH 175)

Objectives and Outcomes:

Students will be able to:

- Use MATLAB to perform different mathematical operations to solve engineering problems
- Understand the utilize the array operations in MATLAB
- Develop flowcharts and efficient codes using different logic operations and loops
- Build custom subroutines using different types of functions available in MATLAB
- Understand different plotting techniques and curve fitting in MATLAB
- Improve programming skills including debugging and documentation

Relevance to Job Market:

This class covers the fundamentals of computation and programming using MATLAB. It introduces the students to many features and functions that are built-in in MATLAB and its accompanying toolboxes. It teaches students how to utilize this computational tool and applying the Computational Problem-Solving Process which can be applied to any real-life engineering problem to get a reliable, fast and efficient solution.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Class assignments require the use of MATLAB to solve various engineering problems using built-in features, user-defined functions, and systematic programming techniques.	
Measured by: Class assignments, tests.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2020

Course Number and name: ET 205: Mathematical Methods for Engineering

Course Description: Credit 3 hours. A post-calculus mathematics course specifically designed for engineering technologists. Topics include vectors, matrices, determinants, complex numbers, applied differential equations, and Laplace Transform. (Spring and Fall)

Pre-requisite courses: MATH 200: Calculus I

Minimum Topics Covered:

- Linear algebra: vectors, matrices, determinants
- Complex numbers
- Ordinary differential equations and applications
- Laplace Transform and applications

Pre-requisite Topics:

- Differential and integral calculus (MATH 200)
- Differentiation, Integration, and the calculus of transcendental functions (MATH 200)

Objectives and Outcomes:

Students will be able to

- Understand the fundamentals of linear algebra such as vectors, matrices, and determinants
- Solve a set of simultaneous equations by solving a matrix-vector equation
- Understand complex numbers
- Derive and solve ordinary differential equations that characterize engineering systems
- Use Laplace transform to transform ordinary differential equations (ODEs) into algebraic equations

Relevance to Job Market:

This class teaches the students post-calculus mathematics needed for engineering technologists. Topics include linear algebra (vectors, matrices, and determinants), complex numbers, power series, and applied differential equations. This course provides the students with the mathematical background and tools needed to study upper level ET courses such as Statics, Dynamics, Fluid Mechanics, Vibration, Circuit Analysis, Heat Transfer, and Machine Control with application examples. As a result, this course prepares the students to analyze and solve various real-world engineering problems after completing the ET program.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: In each section, this course solves application examples related to the upper level ET courses	
Measured by: Class assignments and tests.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET212: Introduction to Programming

Course Description: Credit 3 hours. Basic concepts of computer programming, problem solving, algorithm development, and program coding using a high-level language such as C++ or Visual C++. (Spring and Fall)

Pre-requisite courses: MATH 175 Pre-Calculus with Trigonometry

Minimum Topics Covered:

- Fundamentals of C
- Variables and constants
- Operators
- Conditionals such as "if" and "switch" statement
- Looping and iteration
- C preprocessor
- Functions
- Array and strings
- Fundamentals of microcontroller programming

Pre-requisite Topics:

- Function properties and graphs
- Inverse functions; linear, quadratic, polynomial, rational, exponential and logarithmic functions with applications
- Trigonometric functions and graphs; inverse trigonometric functions
- Fundamental identities and angle formulas;
- Solving equations
- Triangles with applications.

Objectives and Outcomes:

Students will be able to:

- Become familiar with the use of C language
- Use the library functions in programming
- Develop an algorithm for a given problem
- Write and run C programs
- Write and run microcontroller programs

Relevance to Job Market:

This class teaches students the fundamentals of programming in C. The students learn how to develop a flowchart and convert it to a C program for a given problem. In this course, the students study the fundamentals of

microcontrollers and how to program and interface them with external devices for sensing and control. In this course the students learn to design and develop applications for given programming problems, which is the basis of various upper level programming and applied engineering courses and the basis of solving practical problems in industry as well.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: In this course the students learn how to develop an algorithm, a flowchart, and c programs to solve various engineering problems. The students also learn how to program Arduino boards and to interface them to external electrical and electronic devices to solve practical engineering problems.	
Measured by: Class assignments, tests, and term project.	
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
Justification: The term project requires building, testing, and demonstration of an Arduino control system that meets specified design and performance criteria.	
Measured by: Term project.	

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Course Specifications Sheet
Fall 2019

Course Number and name: ET 213: Electrical Circuits

Course Description: A study of the fundamentals of electrical equipment and installations related to engineering technology. Topics include DC and AC power, electrical measurements, print reading, electrical wiring, application of network laws and theorems, nodal and mesh analysis for passive RLC circuits, transformers and polyphase circuits, illumination, heating, wiring codes and specifications. A laboratory fee is required for this course.

Pre-requisite courses: MATH 165: Precalculus with Trigonometry

Minimum Topics Covered:

- DC circuits
- AC circuits
- Resistors
- RLC Circuits
- Nodal and mesh analysis
- Thevinin equivalent
- Batteries
- Applications
- Design methods

Pre-requisite Topics:

- Linear Algebra (MATH 165)
- Problem Solving (ET 100)

Course Objectives:

Students will be able to:

1. Student demonstrates an ability to use tools and analyze data in the Energy Engineering Technology concentration; for example, power electronics, oscilloscopes, protoboards, signal generators, multimeters, energy conversion devices, etc. (1.1)
2. Student demonstrates an ability to use methods to design components and systems appropriate to the discipline; for example: the design and analysis of energy conversion devices. (2.1)
3. Student demonstrates an ability to follow evidence-based approaches common in energy engineering technology to validate design and analysis of components, systems and processes appropriate to the discipline; For example, using basics of electrical circuits and electronics to validate some complex circuits such as voltage regulators. (2.2)
4. Student demonstrates ability to effectively and clearly express thoughts in written presentations, examples: technical reports, field experience observations, etc. (3.1)
5. Student demonstrates an ability to conduct standard tests and measurements; using equipment and/or methods that are typically used in energy engineering technology; for example, finding optimal location for installation of solar panels using common tests, measuring voltage output of photovoltaic panels, etc.(4.2)

6. Student demonstrates an ability to conduct standard tests and experimentation common in the energy engineering technology, then analyze and interpret the data, and make necessary improvements; for example, design some basic projects and circuits for renewable sources such as wind turbine, photocell, and solar cells. (4.3)
7. Student shows qualities that promote constructive team work; for example, punctuality, flexibility, appreciation, and respect.
8. Student demonstrates ability to effectively participate and function as a team member, to fulfill the assigned duties and to meaningfully contribute to the overall success of the team. (5.2)

Relevance to Program Learning Outcomes and Evaluation:

SO 1.1	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. Uses appropriate tools to collect and analyze data.
Justification: Lab assignments require use of protoboards, Integrated circuits, oscilloscopes, digital meters, and interfaces built out of electronic components.	
Measured by: Class laboratory assignments, tests.	
SO 2.1	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline. Uses appropriate methods and/or software to design components and systems.
Justification: Class assignments require the building, testing, and demonstration of working prototypes of systems that meet specified design and performance targets.	
Measured by: Class assignments, tests.	
SO 2.2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline. Uses evidence-based approach to validate design and analysis.
Justification: Class assignments require designing and adjusting the design based on results obtained during the lab activities. The students build electronic projects that must be adjusted to different results, frequencies, amplitudes or supplying electrical feedback.	
Measured by: Class assignments, laboratory reports, tests.	
SO 3.1	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
Justification: A class project requires performing research regarding individuals important to electrical engineering. The students must produce an investigative paper and present the paper in front of peers.	
Measured by: Class assignment, report evaluation and class presentation.	
SO 4.2	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes. Ability to use equipment and/or methods to perform tests common in the field.

Justification: Class assignments require the building of systems which in turn requires testing and debugging to improve the design so as to attain specified performance which require prototyping, use of handheld or bench multimeters, require the use of oscilloscopes. Specialty lab tools such as FLIR, digital probes and other measurement tools will be used as needed for lab experiments.	
Measured by: Class laboratory assignments and reports.	
SO 4.3	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes. Ability to make improvements to a design on the basis of experimentation.
Justification: Class assignments require the building of systems which in turn requires testing and debugging to improve the design so as to attain specified performance. Subsequent iteration of the laboratory assignment requires improved performance.	
Measured by: Class assignments, laboratory reports, homework and exams.	
SO 5.1	An ability to function effectively as a member or leader on a technical team. Demonstrate traits conducive to team work (punctuality, flexibility, respectfulness)
Justification: Laboratory assignments require teamwork. Students must work together in teams while being respectful.	
Measured by: Student attendance is taken. Lab performance is monitored and corrected as needed by the faculty member.	
SO 5.2	An ability to function effectively as a member or leader on a technical team. Recognizes participant roles in a team setting and fulfills appropriate roles to ensure team success.
Justification: Laboratory assignments require teamwork with individuals changing leadership roles. Students must work together in teams while being respectful.	
Measured by: Lab performance is monitored and corrected as needed by the faculty member.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 215: Digital Computer Logic And Organization

Course Description: Credit 3 hours. Prerequisite: ET 100. An introduction to computer organization and digital logic design. Provides an understanding of the basic hardware makeup of a computer and the basic concepts of its operation. The course includes Boolean algebra and binary arithmetic, basic building blocks of digital hardware, combinational and sequential circuits and their design methods using standard logic design chips, basic computing cycles, machine instructions, microprogramming, and I/O communication.

Pre-requisite courses: ET-100: Introduction to Engineering Technology

Minimum Topics Covered:

- Number Systems and Codes
- Analysis and Synthesis of Logical Circuits
- Boolean Algebra
- State diagrams
- Gates and Switching Circuits
- Combinational Circuits
- Simplification of Combinational Circuits
- Race Hazards
- Modular Design
- Decoders, Encoders, Multiplexers, Registers, PROM Circuit Structures, Programmable Logic Arrays
- Combinational Circuit Design with Programmable Logic Devices
- Sequential Circuits
- Flip-Flops
- Timing Circuits
- Counters
- Shift Registers
- Finite-State Machine Design Methods
- Firmware and Microprogramming
- Computer Organization
    - Register transfers
    - Basic CPU organization
    - Instructions and formats
    - Fetch-Execute cycles
    - Basic I/O
    - Basic system memory concepts

Pre-requisite Topics:

- Understanding of basic engineering methodology (ET-100)

Objectives and Outcomes:

Students will be able to:

- Calculate the output of logic functions.
- Represent logical functions in Canonical form and with AND, OR, NOT, NAND, NOR logic gates.
- Design Combinational circuits.
- Simplify Combinational circuits using Karnaugh maps and QM method.
- Use the functionality of flip-flops to design Sequential circuits
- Be able to convert a state diagram to a complete design using MSI components
- Be able to design a sequential circuit using memory chips and microprogramming principles
- Be able to design and implement combinational and sequential circuits using a prototyping board and basic logic chips.
- Articulate the basic architecture of a simple computing system
- Articulate the basic instruction formats and execute cycles in a simple computing system

Relevance to Job Market:

This class teaches students Boolean algebra, the fundamentals of logic design, and an understanding of the basic organization of a computing system. It is relevant to a computer engineering technology career as it teaches skills needed in dealing with digital electronics hardware. It also serves to facilitate other courses (such as microprocessors, robotics, design etc.) which are also very important to job acquisition and retention in the field. It provides students with skills that are fundamental for digital systems analysis as well as for design and development applications such as digital electronics, prototyping, robotics, implementation of controls and interfaces, etc. which are currently at the core of expected workplace demands for computer engineering technologists.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Lab assignments require the use of Boolean algebra, analysis methods, digital design methodologies, function optimization methods, and building prototype circuits in order to solve computer engineering technology problems.	
Measured by: Class assignments, tests.	
SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
Justification: Class assignments require the building, testing, and demonstration of working prototypes of systems that meet specified design and performance targets.	
Measured by: Class assignments, tests.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.

Justification: Class assignments require the building of systems which in turn requires testing and debugging to improve the design so as to attain specified performance.
Measured by: Class assignments, reports.

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Course Specifications Sheet
Spring 2020

Course Number and name: ET221: Programming for Technologists

Course Description: Credit 3 hours. Prerequisite: Engineering Technology 212. An introduction to object oriented computer programming, data structures, basic algorithms, and basic elements of software engineering. Program coding using a high level language such as C++ or similar.

Minimum Topics Covered:

- Object Technology and the UML
- Class Scope and Accessing Class Members
- Separating Interface from Implementation
- Composition Data Abstraction and Information Hiding
- Operator Overloading
- Inheritance
- Polymorphism
- Templates

Pre-requisite Topics:

- Fundamentals of C
- Variables and constants
- Operators
- Conditionals such as “if” and “switch” statement
- Looping and iteration
- C preprocessor
- Functions
- Array and strings
- Fundamentals of microcontroller programming

Objectives and Outcomes:

Students will be able to:

- Become familiar with Object Oriented Programming
- Be able to use existing Classes in applications
- Be able to design custom Classes based on problem specifications
- Be able to implement custom Classes based on design specifications
- Be able to design software implementations using custom Classes along with standard Classes.
- Identify a problem which can be solved realistically as a final project whose solution involves use of a microcontroller, appropriate input output devices, and imbedded software.
- Design a hardware software system to address the problem selected.
- Implement the design for the hardware software system.
- Provide appropriate documentation for the system. Documentation should take the form of a standard IEEE Conference standards.
- Provide a presentation which includes an explanation and justification of the project along with a

demonstration.

Relevance to Job Market:

This class teaches students the fundamentals Object Oriented Programming. The students learn how to analyze a problem and develop an object oriented solution using UML. Students will then be able to implement this solution as a C++ program. Students will build on the fundamentals of microcontrollers programming and interfacing established in ET 212. Students will select projects which involve use of multiple input output devices. They will design, implement and provide documentation for these projects. In this course the students learn to design and develop both object oriented software applications and hardware / software systems. These skills are requisites for a number of upper level courses and are often the basis of solving practical problems seen in industry.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: In this course the students learn how to develop object oriented solutions, represent them as a uml diagram, and implement this design as a c++ programs to solve various engineering problems. The students also learn how to program Arduino boards and to interface them with external sensors and effectors to solve practical engineering problems.	
Measured by: Class assignments, tests, and term project.	
SO2	An ability to design systems, components, or processes meeting specified needs for broadly defined engineering problems appropriate to the discipline.
Justification: The term project requires building, testing, and demonstration of an Arduino microcontroller based system that meets specified design and performance criteria.	
Measured by: Term project.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: Students will determine empirically whether or not their software and software / hardware systems perform as specified and modify as necessary to reach these specifications.	
Measured by: Class assignments, and term project.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET-225: ELECTRONICS I

Course Description: Introduction to electronics including characteristics and applications of diodes, transistors (BJT and FET), logic gates, digital and analog integrated circuits, operational amplifiers, and active circuits using op amps as well as concepts of power electronics including inverters and converters. Analysis and design of analog electronic circuits involving rectifiers, amplifiers, oscillators and other components will also be discussed.

Pre-requisite courses: ET 213: Electrical Circuits

Minimum Topics Covered:

- Introduction to concepts of analog and digital electronics
- P and N type semiconductors, and device fabrication
- Junction diode characteristics and applications: rectifiers, clipping, and clamping
- Junction and field-effect transistor characteristics
- Basic concepts of analog and digital ICs
- Ideal and practical op amps and their applications: amplifiers and filters
- Basic analog electronic circuits: analysis and design, amplifiers, filters, oscillators
- Experiments in electronics: device characteristics, amplifiers, filters, oscillators, frequency response
- Introduction to design of analog electronic circuits

Pre-requisite Topics:

- DC Circuits (ET-213)
- AC Circuits (ET-213)
- Linear Algebra (MATH-175)

Course Objectives:

Students will be able to:

1. Student demonstrates an ability to use tools and analyze data in the Energy Engineering Technology concentration; for example, power electronics, oscilloscopes, protoboards, signal generators, multimeters, energy conversion devices, etc. (1.1)
2. Student utilizes the scientific approach to solve Energy Engineering Technology problems. The student will learn through laboratory assignments how to resolve problems and improve designs.(1.2)
3. Student demonstrates an ability to use methods to design components and systems appropriate to the discipline; for example: the design and analysis of semiconductor devices. (2.1)
4. Student demonstrates an ability to follow evidence-based approaches common in energy engineering technology to validate design and analysis of components, systems and processes appropriate to the discipline; For example, using basics of electrical circuits and electronics to validate some complex circuits such as voltage regulators. (2.2)
5. Student will learn how to use simulation software such as Simulink to simulate circuits(2.3)
6. Student will use Excel to interpret and graph laboratory assignments (4.1)
7. Student demonstrates an ability to conduct standard tests and measurements; using equipment and/or methods that are typically used in energy engineering technology; for example, finding optimal

location for installation of solar panels using common tests, measuring voltage output of photovoltaic panels, etc.(4.2)

8. Student demonstrates an ability to conduct standard tests and experimentation common in the energy engineering technology, then analyze and interpret the data, and make necessary improvements; for example, design some basic projects and circuits for renewable sources such as wind turbine, photocell, and solar cells. (4.3)

Relevance to Program Learning Outcomes and Evaluation:

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. Uses appropriate tools to collect and analyze data.
Justification: Lab assignments require use of protoboards, Integrated circuits, oscilloscopes, digital meters, and interfaces built out of electronic components. *Justification:* Homework, in class assignments, lab assignments require use of protoboards, Integrated circuits, oscilloscopes, digital meters, and interfaces built out of electronic components.	
Measured by: Class laboratory assignments, tests.	
SO 2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline. Uses appropriate methods and/or software to design components and systems.
Justification: Class assignments require the building, testing, and demonstration of working prototypes of systems that meet specified design and performance targets. *Justification:* Class assignments require designing and adjusting the design based on results obtained during the lab activities. The students build electronic projects that must be adjusted to different results, frequencies, amplitudes or supplying electrical feedback. *Justification:* The students will simulate laboratory assignments prior to building the circuit.	
Measured by: Class assignments, laboratory reports, tests, In class performance monitoring.	
SO 4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes. Ability to use equipment and/or methods to perform tests common in the field.
Justification: Class assignments require the building of systems which in turn requires testing and debugging to improve the design so as to attain specified performance which require prototyping, use of handheld or bench multimeters, require the use of oscilloscopes. Specialty lab tools such as FLIR, digital probes and other measurement tools will be used as needed for lab experiments. *Justification:* Laboratory assignments shall require using common lab equipment to obtain measurements and to collect results and analyze circuit performance. *Justification:* Class assignments require the building of systems which in turn requires testing and debugging to improve the design so as to attain specified performance. Subsequent iteration of the laboratory assignment requires improved performance.	
Measured by: Class assignments, laboratory reports, homework and exams, In class performance monitoring.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 226: Electronics II

Course Description: Credit 3 hours. Review of semiconductors, diode theory and circuits, and BJT transistors. Introduction to transistor biasing, AC models, voltage amplifiers, CC and CB amplifiers, JFETS, Thyristors, differential amplifiers, operational amplifiers and circuits. A laboratory fee is required for this course. (Spring)

Pre-requisite courses: ET 225: Electronics I

Minimum Topics Covered:

- Introduction to binary systems and gates
- Design and analyze switching circuits
- Bipolar Junction Transistors and their applications as amplifiers or switches
- Operational amplifiers
- Electronics applications (e.g. stepper motor controller, DC motor controller, 7-segment controllers, DC motor encoders)

Pre-requisite Topics:

- Electrical circuits knowledge (ET 213)
- Transistors and other electronic chips (ET 225)

Objectives and Outcomes:

Students will be able to:

- Understand the digital communication and its importance in today's applications.
- Saturate transistors and apply modifications to the circuit that lead to transistor saturation for use as a switching device.
- Bias transistors for use as amplifiers.
- Understand the difference between the different amplifier configurations and the benefits of these models.
- Use low level electronics components to construct DC motor and stepper motor drive circuits
- Program EEPROM chips and store data on them to be displayed on 7-segment displays
- Build a final project to measure the speed of a stepper motor using: infrared sensor, 3D printed parts, 7-segment display, counter, shift register, etc.
- Troubleshoot connections and components.

Relevance to Job Market:

This class teaches students how to use electronics and make use of them in practical applications. Amplifiers are needed in many applications, especially at this time of miniaturizing systems. The class also teaches how to build embedded systems using discrete and abstract electronic components. This elementary way of building the system using their basic components is essential to understand the interaction between all these components.

Relevance to Program Learning Outcomes and Evaluation:

SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
Justification: Class assignments require the building, testing, and demonstration of working prototypes of systems that meet specified design and performance targets.	
Measured by: Class assignments, projects.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: Class assignments require the building of systems which in turn requires testing and debugging to improve the design so as to attain specified performance.	
Measured by: Class assignments, tests.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 231: Surveying I

Course Description: Credit 3 hours. Engineering principles and practices of surveying applied to instrumentation, computation, and

construction site layout dealing with both commercial and residential construction.

Two hours of lecture and two hours laboratory per week. A laboratory fee is required for this course. (Spring)

Pre-requisite courses: Prerequisite: ET 100

Minimum Topics Covered:

- Construction Surveys
- Theory of Differential Leveling
- Gunter's Chain
- Benchmark Leveling
- General Background of a Total Station

Pre-requisite Topics: None

Course Objectives:

- Become familiar with the fundamentals of Surveying.
- Develop basic skills in the use of instruments in Surveying.
- Instill an attitude for accuracy in reading and plotting surveying positions.
- Develop an understanding of residential and commercial surveying

Relevance to Program Learning Outcomes and Evaluation:

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;

1.1 Uses appropriate tools to collect and analyze data
1.2 Follows scientific approach to solve broadly defined engineering problems

Justification: Lab assignment require the student to use the tools in the lab to survey a given a project.

Such tools used were, Gunter's chain, Tapes Plumb Bob, Hand Level, Story pole, Theodolites ect.

Measured by: Class work completed, reports and test

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

4.1 Uses advanced software to interpret data (Excel, MATLAB, SolidWorks, COMSOL, etc)
4.2 Ability to use equipment and/or methods to perform tests common in the field
4.3 Ability to make improvements to a design on the basis of experimentation

Justification: Student were to lay out a 10'-0" x 10'-0" pad using batter boards and string line and Theodolites.

Measured: Once the student finished the lay out they were check by cross dimensioning to see if the string lines were square if not the adjustments were made to correct this problem.

SO 5 An ability to function effectively as a member or leader on a technical team.

5.1 Demonstrate traits conducive to team work (punctuality, flexibility, respectfulness)
5.2 Recognizes participant roles in a team setting and fulfills appropriate roles to ensure team success.

Justification: The assigned project is broken down into group activities, were a group of three or more student are assigned
an activity to complete, in this group the student rotate around to different position so that each student understands
what each aspect of a lay out of a construction project is about.

Measured: This is a subjective observation that the instructor does while the project is going on an student are graded on involvement.

Relevance to the Job Market:

The understanding and ability to use surveying equipment means that the employer does not have to spend time training the employee in the pieces of equipment needed for the project that the employee is hired for.

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET 232: Surveying II

Course Description: Credit 3 hours. Theory and supervised field practice in the layout of engineering and construction projects utilizing extensive surveying principles,

applied science, mathematics, legal implications and computer applications. Two hours of lecture and two hours of laboratory per week. A laboratory fee is required for this course. (Fall)

Pre-requisite courses: Prerequisite: ET 231

Minimum Topics Covered:

Basics of Surveying

- The Global Positioning System (GSI)
- Electronic Distance Measuring Instruments (EDMs)
- Remote Sensing a. satellite imagery, b. airborne imagery
- Construction Surveys
- Land Surveying
- Highway and Highway curves

Pre-requisite Topics: None

Course Objectives:

- Become familiar with the fundamentals of Surveying.
- Develop basic skills in the use of instruments in Surveying.
- Instill an attitude for accuracy in reading and plotting surveying positions.
- Develop an understanding of residential and commercial surveying.

Relevance to Program Learning Outcomes and Evaluation:

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;

1.1 Uses appropriate tools to collect and analyze data
1.2 Follows scientific approach to solve broadly defined engineering problems

Justification: Lab assignment require the student to use the tools in the lab to survey a given a project.
Such tools used were, Total Station, IMU and RTK units , hand –held Garmin e-Map receiver ect.

Measured by: Class work completed, reports and test

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

4.1 Uses advanced software to interpret data (Excel, MATLAB, SolidWorks, COMSOL, etc)
4.2 Ability to use equipment and/or methods to perform tests common in the field
4.3 Ability to make improvements to a design on the basis of experimentation

Justification: Student were to lay out a building footprint from a set of drawing, using the Total Station unit .

Measured: Once the student finished the lay out they were checked for accuracy made to correct this problem.

SO 5 An ability to function effectively as a member or leader on a technical team.

5.1 Demonstrate traits conducive to team work (punctuality, flexibility, respectfulness)
5.2 Recognizes participant roles in a team setting and fulfills appropriate roles to ensure team success.

Justification: The assigned project is broken down into group activities, were a group of three or more student are assigned
an activity to complete, in this group the student rotate around to different position so that each student understands
what each aspect of a lay out of a construction project is about.

Measured: This is a subjective observation that the instructor does while the project is going on an student are graded on involvement.

Relevance to the Job Market:

The understanding and ability to use surveying equipment means that the employer does not have to spend time training the employee in the pieces of equipment needed for the project that the employee is hired for.

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET 234: Concrete and Masonry Design

Course Description: Credit 3 hours. Discussion about materials, methods, constructability, equipment, drawings and specifications related to reinforced concrete and masonry structural elements such as beams, girders, slabs, post tension slabs, and columns in accordance with current ACI codes and standards. (Fall)

Pre-requisite courses: ET 132: Construction Materials and Methods
ET 271: Engineering Statics

Minimum Topics Covered:

- Production of concrete
- Mechanical properties of concrete and steel reinforcement
- Loads on reinforced concrete elements
- Analysis and design or reinforced concrete beams
- Analysis of one-way slabs
- Shear resistance of concrete members
- Design and analysis of reinforced concrete columns
- Analysis of reinforced concrete footings
- Masonry units and mortars

Pre-requisite Topics:

- Basic knowledge of construction process and materials (ET 132)
- Force analysis, moments and internal forces (ET 271)

Objectives and Outcomes:

Students will be able to:

- Acquire knowledge about the main characteristics of concrete.
- Become familiar with design methods/codes of concrete structural elements.
- Check the safety and stability of simple reinforced concrete element.
- Understand the requirements and details of reinforcement in RC members.
- Obtain basic knowledge about types and properties of masonry structures.
- Apply gained knowledge to design simple concrete/masonry building.

Relevance to Job Market:

This class provides student with the basic knowledge about concrete as a construction material. It allows student to become familiar with the main requirement of the current standards used in construction industry like ACI-318 and ASTM testing standards. The course also provides the student with the ability to identify problems and mistakes in reinforcement details which allow them to work in jobs related to quality control and inspection of concrete structure. Finally, the course provides the basics of masonry structures, their types, requirements and

material properties. Concrete along with masonry are some of the most used construction material, therefore this class improve the competitiveness of the students in the job market.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Class assignments, quizzes and tests require the use of math, physics and other engineering knowledge to perform structural analysis of the forces affecting reinforced concrete elements.	
Measured by: Class assignments, quizzes, tests.	
SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
Justification: Class assignments, quizzes and tests require the design and check of safety of structural elements like beams, slabs, foundation columns and walls.	
Measured by: Class assignments, quizzes, tests.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET 241: Introduction to Engineering Materials

Course Description: An introduction to engineering materials with focus on mechanical behavior of materials, material properties, industrial applications, limitations and selection of materials. Topics include atomic structure and bonds, stress and strain analysis, engineering structures, environmental consideration, limitations and failures, and properties testing and measurement of materials.

Pre-requisite courses: MATH 175: Pre-Calculus with Trigonometry

Minimum Topics Covered:

- Introduction to engineering materials, classified under metals, polymers, ceramics and composites
- Basic thermal, electrical and optical properties
- Concept of stress and strain, and basic mechanical properties, including the elastic modulus and shear modulus
- Basic physical and microstructural characteristics, especially of metals
- Relationship between materials properties, processing and structure

Pre-requisite Topics:

- Linear Algebra and Trigonometry (MATH 175)

Objectives and Outcomes:

Students will be able to:

- Classify and select engineering materials based on properties and application.
- Understand the relationship between material properties, structure and processing.
- Understand basic physical and mechanical properties of different classes of materials.
- Understand basic processing mechanisms and how they determine properties.
- Demonstrate the ability to perform quantitative analysis of material properties.

Relevance to Job Market:

An understanding of the different classes of materials that are used in engineering practice is essential for all engineering and technology students. This class provides the technology student with a broad understanding of engineering material types, and their properties, processing and microstructure. It teaches the student basic quantitative analysis techniques used in determining physical and mechanical properties, and how these properties are used in selecting materials for engineering applications.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Classroom lectures provide the student with techniques and skills required to make qualitative and quantitative assessments of different materials used in engineering practice, and relate their analysis to selection of materials.	
Measured by: Quizzes, tests, homework assignments and final exam.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: Classroom lectures and laboratory demonstrations provide the student with an understanding of different testing equipment and experiments that are used to determine material properties.	
Measured by: Quizzes, reports.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET 244: Construction Regulation, Contracts and Specifications

Course Description: Credit 3 hours. A study of codes and specifications required by municipality, counties/parishes, and states as well as construction contracts and professional ethics. Topics include contractual relationships amongst construction parties, types of agreements, worker's compensation, insurance, and ethics in construction. (Fall)

Pre-requisite courses: Prerequisite: ET 132

Minimum Topics Covered:

- Construction Regulation " Building Codes"
- Successful Construction Contracting
- Business Ownership
- Company Organization
- Project Design and Contract and Bid Documents for a Project
- Contract Surety Bonds
- Construction Insurance
- Project Management and Administration
- Project Time Management
- Project Cost Management
-

Pre-requisite Topics: None

Course Objectives:

- Differentiate between types of contractual relationships used in construction industry.
- Understand of the fundamental works in different contract types.
- Recognize the basic concepts of insurance and bonds in the construction.
- Appreciate fundamental ethics in construction environment.
- Become familiar with regulations dealing with labor force in construction industry.
- Acquire knowledge of local, state and national codes involved with construction

Relevance to Program Learning Outcomes and Evaluation:

SO 3 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

3.1 Writes reports and applies proper guidelines (cover page, introduction, method, results, analysis, uses complete and grammatically correct sentences)

3.2 Communicates confidently and professionally in front of audience (proper appearance, faces the audience, responds to audience questions)

3.3 Uses technology and modern techniques to communicate technical information (Moodle, Power-points, computers, projectors, charts, tables, illustrations)

Justification: Class assignment will be issued and turned in for a grade. Following a format that is commonly used in writing reports in industry.

Measured: Class work completed on different aspects of assignments and test.

SO 5 An ability to function effectively as a member or leader on a technical team.

5.3 Demonstrate traits conducive to team work (punctuality, flexibility, respectfulness)
5.4 Recognizes participant roles in a team setting and fulfills appropriate roles to ensure team success.

Justification: The assigned project is broken down into group activities, were a group of three or more student are assigned an activity to complete, in this group the student rotate around to different position so that each student understands what each aspect of in estimating a building.

Measured: Class work completed on different aspects of assignments, and test

Relevance to the Job Market:

The understanding and ability to know what contracts are and specification means will help the employer in not have to spend time training the employee in this aspect of a project that the employee was hired for.

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2020

Course Number and name: ET 271: Engineering Statics

Course Description: This course uses vector methods for the study of force, coupled and equivalent force systems, equilibrium of particles and rigid bodies, centroids, centers of gravity, moments of inertia, and virtual work. It includes analysis of simple structures such as trusses and beams, application of dry friction models to belts and wedges and the method of virtual work.

Pre-requisite courses: MATH 175: Pre-Calculus with Trigonometry

PHYS 191: General Physics

Minimum Topics Covered:

- Vector methods in rigid-body mechanics
- Mechanics of objects at rest or in uniform motion
- Mechanics of distributed loading and simple trusses
- Dry friction characteristics
- Center of gravity and Centroid
- Moments of inertia

Pre-requisite Topics:

- Linear Algebra and Trigonometry (MATH 175)
- Basic differentiation and integration (MATH 175)
- Basic physics of solids (PHYS 191)

Objectives and Outcomes:

Students will be able to:

- Analyze forces acting on particles, and forces and moments acting on rigid bodies in equilibrium.
- Analyze distributed loading and simple trusses and determine resultant forces and moments.
- Use the methods of vector algebra to analyze forces and moments acting on solid bodies in equilibrium.
- Analyze dry friction behavior in rigid bodies in equilibrium.
- Determine center of gravity and centroid of simple composite bodies.
- Determine area moments of inertia of simple composite bodies.

Relevance to Job Market:

This class provides students with an understanding of forces and moments that act on solids, and how to analyze them when the body is in static equilibrium. Students learn how to determine the resultant effect of distributed loads on engineering structures, in addition to determining center of gravity and centroid of common objects. A basic theory of dry friction and its relevance to engineering applications is also

included in this course. These skills are necessary for students majoring in construction engineering technology and mechanical engineering technology.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Major emphasis is placed on the tools and techniques used to solve quantitative problems associated with particles and rigid bodies in equilibrium, immediately after a fundamental concept is introduced in class. Group problem-solving during the class period provides the student with the opportunity to learn actively while in class.	
Measured by: Quizzes, homework assignments, tests and final exam.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2020

Course Number and name: ET 283: Manufacturing Processes

Course Description: This course serves as an introduction to a broad range of traditional and non-traditional manufacturing processes. Topics include casting and solidification processes, forming and shaping processes, material removal processes, joining processes, and other topics in manufacturing processes.

Pre-requisite courses: ET 241: Introduction to Engineering Materials

Minimum Topics Covered:

- Fundamental concepts involved in manufacturing engineering
- Fundamental physical and mechanical properties involved in manufacturing
- Outline of modern manufacturing methods involving metals, ceramics, and polymers
- Quantitative analyses in important areas of manufacturing, such as solidification processing, metal-forming, heat treatment, and machining technologies

Pre-requisite Topics:

- Linear Algebra (MATH 175)
- Basic Physics (PHYS 191)
- Introductory materials engineering (ET 241)

Objectives and Outcomes:

Students will be able to:

- Understand the fundamental concepts involved in manufacturing and production of engineered goods.
- Understand the relationship between material properties and design and manufacturing.
- Analyze quantitative problems associated with common manufacturing practices such as metal casting and forming techniques.

Relevance to Job Market:

This is an introductory course that provides the mechanical engineering technology student with an understanding of the methods and principles involved in several key areas of conventional manufacturing. These skills familiarize the student with the techniques necessary for solving problems associated with the design and manufacture of engineered components, such as castings, extruded products, machined components, etc.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Quantitative problems from each topic are solved in class in order to establish the underlying engineering and mathematical principles involved in manufacturing. Group problem-solving during the class period provides the student with the opportunity to learn actively while in class.	
Measured by: Homework assignments, tests and final exam.	
SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
Justification: The methods used to design and build manufacturing systems to meet specific criteria, such as a steel rolling mill or a heat treatment process for gears and axles, are demonstrated through example problems and group problem-solving.	
Measured by: Class assignments, homework assignments, tests and final exam.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET 305: Human Factors Engineering

Course Description: Credit 3 hours. This course provides the student with a basic knowledge of human factors design principles and the nature of human interaction with their physical work environment. The course introduces cognitive engineering, ergonomics, system design, and the nature of human performance in the workplace. (Fall, Spring)

Pre-requisite: Junior Standing

Minimum Topics Covered:

- Introduction to Human Factors
- Research Methods
- Design and Evaluation Tools
- Visual Sensory System
- Auditory, Tactile, and Vestibular Systems
- Cognition
- Decision Making
- Displays
- Control
- Anthropometry and Workplace Design
- Biomechanics of Work
- Work Physiology
- Stress and Workload
- Safety and Accident Prevention

Objectives and Outcomes:

Students will be able to:

- Describe the meaning and importance of human factors engineering
- Relate human sensory, cognitive, and physical capabilities and limitations to the design of human-machine systems
- Select and correctly use appropriate human-machine system analysis and design tools
- Apply sound human-machine system design principles to develop written and graphical design specifications
- Recognize and construct proper recommendations to correct human factors deficiencies in human-machine systems in written and/or graphical form
- Design, conduct, and document a human factors experiment or study for a research project

Relevance to Job Market:

This class teaches students fundamentals of human factors design principles and the nature of human interaction with their physical work environment. It includes human factors basics, human-machine system, and human performance in the workplace. It prepares students to perform a human factors analysis in either a job that

students select from an industrial, service or small business worksite, or a product/system that has human factors problems/deficits.

Relevance to Program Learning Outcomes and Evaluation:

SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: Group project requires that students assess and summarize human factors risk factors, and construct and recommend appropriate interventions or redesign solutions.	
Measured by: Group project.	
SO5	An ability to function effectively as a member or leader on a technical team.
Justification: Group project requires that students work together to apply the principles learned in class to conduct a human factors analysis in a real-life situation.	
Measured by: Group project report and oral presentation.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 320: Microprocessors and Interfacing

Course Description: Credit 3 hours. An introduction to principles of microprocessor and microcontroller operation, CPU, memory, buses and I/O interfaces. Topics include microcomputer-based system design, Windows programming, and interfacing. This course includes a design project. A laboratory fee is required for this course. (Spring)

Pre-requisite courses: CMPS 297: Logic Design

Minimum Topics Covered:

- Simple CPU organization
- Buses, I/O operation, and I/O modes (I/O mapping, wait/go, daisy chaining, DMA, etc).
- Basic microcontroller examples (Arduino, Raspberry Pi, or equivalent)
- Issues in interfacing a microprocessor with external hardware; GPIO.
- Issues in D/A and A/D signal conversion for the purposes of interfacing
- Principles of system design with microprocessors
- Principles of Linux operating system and file system; file system attributes, navigation, management, etc.
- Principles of web servers, html forms, and form handlers
- Server side cgi programming; intro PHP; intro Python

Pre-requisite Topics:

- Boolean Algebra (CMPS 297)
- Logic Gates (CMPS 297)

Objectives and Outcomes:

Students will be able to:

- Analyze a computer interfacing problem
- Design a Windows interface application
- Design a hardware interface for a microcontroller or a PC
- Manage signal conversion for interfacing a general device with a microcontroller or a PC
- Utilize testing and development equipment relevant to computer interfacing
- Demonstrate the ability to develop and implement an integrated design of an interfacing application.
- Work and program at least two major microcontrollers of different classes (e.g. Aduino, Linux based such as Raspberry/Beaglebone)
- Remotely access and operate a microcontroller over the web (IOT principles)

Relevance to Job Market:

This class teaches students fundamentals of microcontrollers and how to program them and interface them with general external devices for sensing and control, both locally and remotely over the web. It includes local native programming (Arduino programming, Linux system navigation and management), as well as internet programming (HTML forms, PHP, Python). It prepares students to use microcontrollers for design and development applications such as robotics, remote sensing and control (IOT), industrial controls and interfaces, etc. which are currently at the core of expected workplace demands for computer engineering technologists.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Lab assignments require use of protoboards, Arduinos, Rasperries, Beaglebones, and interfaces built out of electronic components.	
Measured by: Class assignments, tests.	
SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
Justification: Class assignments require the building, testing, and demonstration of working prototypes of systems that meet specified design and performance targets.	
Measured by: Class assignments, tests.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: Class assignments require the building of systems which in turn requires testing and debugging to improve the design so as to attain specified performance.	
Measured by: Class assignments, reports.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 331: Commercial Construction Estimating I

Course Description: Credit 3 hours. Fundamentals of construction estimating procedures, with analysis of light commercial construction prints and specifications to determine the quantity of materials,

labor, equipment and overhead as well as profit as it relates to the bidding process. The use of traditional estimating practices and current computer software for the development of construction bids will also be discussed. (Spring)

Pre-requisite courses: Prerequisite: ET 132

Minimum Topics Covered:

- Overview of the Estimating and Bidding Process Quantity Takeoff
- Concrete, Masonry, Metals, Plumbing, HVAC, and Electrical
- Putting costs to the Estimate
- Ethics

Pre-requisite Topics: None

Course Objectives:

- To provide the student with the basic fundamentals of estimating in commercial and industrial architecture.
- To instill a confidence in the student to successfully estimate all phases of a building project.
- Discuss the procedures of determining quantities and the cost of performing the work

Relevance to Program Learning Outcomes and Evaluation:

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;

1.1 Uses appropriate tools to collect and analyze data
1.2 Follows scientific approach to solve broadly defined engineering problems

Justification: Lab assignment require the student to use the tools in the lab to estimate a residential building.
Such tools are Excel spread sheet, Visio, and Microsoft Project Professional, ect.

Measured by: Class work completed on different aspects of estimating, and test

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

2.1 Uses appropriate methods and/or software to design components and systems
2.2 Uses evidence-based approach to validate design and analysis
2.3 Uses simulation software to test prototypes

Justification: Lab assignment require the student to use the tools in the lab to estimate a residential building.
Such tools are Excel spread sheet, Visio, and Microsoft Project Professional, ect.

Measured: Class work completed on different aspects of estimating, and test

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

4.1 Uses advanced software to interpret data (Excel, MATLAB, SolidWorks, COMSOL, etc)
4.2 Ability to use equipment and/or methods to perform tests common in the field
4.3 Ability to make improvements to a design on the basis of experimentation

Justification: The assignments are to produce a complete material estimate of a residential building.

Measured: Class work completed on different aspects of estimating, and tes

SO 5 An ability to function effectively as a member or leader on a technical team.

5.1 Demonstrate traits conducive to team work (punctuality, flexibility, respectfulness)
5.2 Recognizes participant roles in a team setting and fulfills appropriate roles to ensure team success.

Justification: The assigned project is broken down into group activities, were a group of three or more student are assigned an activity to complete, in this group the student rotate around to different position so that each student understands what each aspect of in estimating a building.

Measured: Class work completed on different aspects of estimating, and test

Relevance to the Job Market:

The understanding and ability to know what residential estimating is gives the employer less time spent on training the employee in this aspect of a project that the employee was hired for.

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET 332: Commercial Construction Estimating II

Course Description: Credit 3 hours. An advanced study of heavy construction estimating for commercial, civil, and industrial construction projects. Includes advanced mathematics to solve conceptual problems that determine the unit price, labor cost, detailed estimating, overhead allocation, bidding strategies, and bid formula. Also includes use of latest estimating software for the development of construction bids for simulated projects. (Fall)

Pre-requisite courses: Prerequisite: ET 331

Minimum Topics Covered:

- Metals
- Wood, Plastics and Composites
- Thermal and Moisture Protection
- Opening and Finishes
- Plumbing
- Electrical
- Avoiding Errors in Estimates
- Ethic
- Submitting the Bid

Pre-requisite Topics: None

Course Objectives:

- Become familiar with advanced fundamentals of Estimating
- Develop basic skills in the use of instruments used in Estimating.
- Instill an attitude for accuracy in Estimating.
- Develop an understanding of commercial and industrial Estimating

Relevance to Program Learning Outcomes and Evaluation:

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;

1.1 Uses appropriate tools to collect and analyze data
1.2 Follows scientific approach to solve broadly defined engineering problems

Justification: Lab assignment require the student to use the tools in the lab to estimate a residential building.
Such tools are Excel spread sheet, Visio, and Microsoft Project Professional, ect.

Measured by: Class work completed on different aspects of estimating, and test

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

2.1 Uses appropriate methods and/or software to design components and systems
2.2 Uses evidence-based approach to validate design and analysis
2.3 Uses simulation software to test prototypes

Justification: Lab assignment require the student to use the tools in the lab to estimate a commercial building.
Such tools are Excel spread sheet, Visio, and Microsoft Project Professional, ect.

Measured: Class work completed on different aspects of estimating, and test

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

4.1 Uses advanced software to interpret data (Excel, MATLAB, SolidWorks, COMSOL, etc)
4.2 Ability to use equipment and/or methods to perform tests common in the field
4.3 Ability to make improvements to a design on the basis of experimentation

Justification: The assignments are to produce a complete material estimate of a commercial building.

Measured: Class work completed on different aspects of estimating, and tes

SO 5 An ability to function effectively as a member or leader on a technical team.

5.1 Demonstrate traits conducive to team work (punctuality, flexibility, respectfulness)
5.2 Recognizes participant roles in a team setting and fulfills appropriate roles to ensure team success.

Justification: The assigned project is broken down into group activities, were a group of three or more student are assigned an activity to complete, in this group the student rotate around to different position so that each student understands what each aspect of in estimating a building.

Measured: Class work completed on different aspects of estimating, and test

Relevance to the Job Market:

The understanding and ability to know what commercial estimating gives the employer less time spent on training the employee in this aspect of a project that the employee was hired for.

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 336: Steel Design

Course Description: Credit 3 hours. The application of principles of strength of materials to the design and analysis of structural steel beams, columns, trusses and frames, as well as connection and base plates in accordance with current AISC specifications. (Spring)

Pre-requisite courses: ET 132: Construction Materials and Methods
ET 271: Engineering Statics

Minimum Topics Covered:

- Properties of structural steel.
- Types of loads on building.
- Design philosophy and load combination (AISC).
- Analysis and design of tension members.
- Analysis and design of compression members.
- Analysis and design of steel beams.
- An overview of steel structures connections.

Pre-requisite Topics:

- Basic knowledge of construction process (ET 132).
- Main characteristics of steel as a building material (ET 132).
- Force analysis and internal forces in structural elements (ET 271).

Objectives and Outcomes:

Students will be able to:

- Identify standard grade, types and sizes of structural steel sections.
- Understand different loads on buildings and their structural systems.
- Analyze and design steel truss members.
- Design and check basic components of steel structure including beams, columns and bracing.
- Identify types of connections between steel structural members.

Relevance to Job Market:

This class prepare student to understand the basic components of steel structures which is very common in the commercial construction industry. The class also provide student with basic understanding of load path in buildings and how to estimate internal forces in structural elements.The students will be familiar with the AISC standards which is used in the U.S. for most steel structures. The class prepare student to work in design and construction firms dealing with steel construction.

Relevance to Program Learning Outcomes and Evaluation:

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;

Justification: Class assignments and projects allow student to use the knowledge they gained in this class and previous classes to calculate internal forces in structural members and check the safety of steel sections used for these members.	
Measured by: Assignments, projects, and tests.	
SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
Justification: Class assignments and project allow student to design and check steel members according to AISC standards.	
Measured by: Assignments, projects, and tests.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 361: Solar Thermal Systems

Course Description: Credit 3 hours. An introduction to solar thermal systems and their applications. Topics include solar radiation, solar thermal materials, solar thermal collectors, solar energy storage, solar cooling, solar thermal power systems, solar thermal efficiency evaluation, and economics of solar thermal systems. (Spring)

Pre-requisite courses: PHYS 191: Gen Physics and MATH 200: Calculus I

Minimum Topics Covered:

- The Sun and Solar Radiation
- Available Solar Radiation
- Heat transfer
- Solar Thermal Materials
- Radiation transmission through glazing
- Flat-plate collectors
- Concentrating Collectors
- Solar Energy Storage
- Solar Process Loads
- Solar process economics
- Applications
- Design Methods

Pre-requisite Topics:

- Gen Physics (PHYS 191)
- Calculus I (MATH 200)

Objectives and Outcomes:

Students will be able to:

- Apply fundamental concepts of solar thermal systems in practical design
- Design and analyze solar thermal collectors
- Design and analyze solar thermal energy storage systems
- Design and analyze solar thermal control systems
- Incorporate solar thermal systems into traditional energy systems
- Conduct economical analysis for solar thermal systems

Relevance to Job Market:

This class teaches students fundamentals of solar thermal systems, which are among the clean and renewable alternative sources of energy. Th class covers many aspects of these systems ranging from working concepts and collector designs to its control systems and economy.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Class assignments require the use of mathematical concepts along with computational tools such as Excel to analyze and design different aspects of solar systems.	
Measured by: Class assignments, tests.	
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.
Justification: Class assignments and project require the students to work in teams to design, simulate and build a prototype of a solar system with a given constraints and working conditions and present the results in oral and written formats.	
Measured by: Class assignments, reports.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 362: Solar and Geothermal Systems

Course Description: Credit 3 hours. This course introduces fundamentals of solar thermal process, solar thermal collectors, solar energy storage, solar cooling, analysis and design of photovoltaic systems including photovoltaic modules, battery, inverters, charge control method, grid integration, and economic impact of solar systems. Topics also include discussion of geothermal systems, the direct and indirect use of geothermal energy in heating and electricity generation, and solar thermal systems and their applications.

Pre-requisite courses: PHYS 191: Gen Physics and MATH 200: Calculus I

Minimum Topics Covered:

- The Sun and Solar Radiation
- Available Solar Radiation
- Heat transfer
- Solar Thermal Materials
- Flat-plate collectors
- Solar Energy Storage
- Solar process economics
- Overview of Wind Energy Business
- Basics of Wind Energy and Power
- Properties of Wind
- Aerodynamics of Wind Turbine Blades
- Wind Measurement
- Wind Resource Assessment
- Advanced Wind Resource Assessment
- Basics and types of Photovoltaics
- Applications
- Design Methods

Pre-requisite Topics:

- Gen Physics (PHYS 191)
- Calculus I (MATH 200)

Objectives and Outcomes:

Students will be able to:

- Apply fundamental concepts of solar thermal systems in practical design
- Design and analyze solar thermal collectors
- Design and analyze solar thermal energy storage systems

- Design and analyze solar thermal control systems
- Incorporate solar thermal systems into traditional energy systems
- Conduct economical analysis for solar thermal systems
- Physical principles of wind turbines and photovaltics
- Wind energy generation and transmission
- Factors affecting efficiency of wind turbines
- Design, fabrication, installation, operation and maintenance of wind turbines
- Environmental issues related to commercial wind turbines
- Cost and benefits analysis of the different renewable energy systems

Relevance to Job Market:

This class teaches students fundamentals of renewable energy including solar thermal, wind turbine and photovoltaic systems, which are among the clean and renewable alternative sources of energy. The class covers many aspects of these systems ranging from working concepts and collector designs to its control systems and economy.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Class assignments require the use of mathematical concepts along with computational tools such as Excel to analyze and design different aspects of solar systems.	
Measured by: Class assignments, tests.	
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.
Justification: Class assignments and project require the students to work in teams to design, simulate and build a prototype of a solar system with a given constraints and working conditions and present the results in oral and written formats.	
Measured by: Class assignments, reports.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 363: Photovoltaics

Course Description: Credit 3 hours. Prerequisite: Engineering Technology 225 or permission of Department Head. An introduction to photovoltaic systems and their applications. Topics include fundamentals of solar radiation, design and construction of solar cells, and basics of semiconductor devices and circuits. The course will also discuss analysis and design of photovoltaic systems including photovoltaic modules, battery, inverters, charge control method, grid integration, and economic impact will also be discussed.

Pre-requisite courses: ET 225: Electronics I, or permission of Department Head

Minimum Topics Covered:

- Introduction to renewable energy systems
- Review of semiconductor physics, devices and circuits
- Types, characteristics, and modeling of solar cells
- Basics of photovoltaic systems and components
- Issues in installation, monitoring, and maintenance
- Design of inverters and charge control circuits for photovoltaic systems
- Applications of photovoltaic systems in residential, commercial, and industrial environment
- Economics and cost analysis of photovoltaic systems
- Integration with conventional power systems and smart grid

Pre-requisite Topics:

- Understanding of basic electrical concepts (ET 225 or other experience)

Objectives and Outcomes:

Students will be able to:

- apply basic concepts of renewable energy generation and utilization in practical design
- apply principles of solar radiation for solar cell design
- test and analyze semiconductor solar cells
- design photovoltaic systems including photovoltaic modules, inverters, charge control circuits etc.
- conduct hands-on installation, testing, and monitoring of photovoltaic systems
- design photovoltaic systems for residential and commercial applications and integrate them into power grid

Relevance to Job Market:

This class teaches students the science, structure, and operation of photovoltaic systems, both stand-alone and grid-connected. Solar energy production has become important in many applications, particularly in remote locations, and it is recently experiencing substantial growth. The course provides students with an understanding

of the photovoltaics technologies as well as related ones (inverters, charge controllers, battery banks), and also provides skills for their design and operation. In this way it provides students with skills that are important to a significant and growing sector of engineering technology job market.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Assignments require use of appropriate analysis and engineering methods to analyze as well as to solve design problems relevant to photovoltaic structures.	
Measured by: Class assignments, tests.	
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.
Justification: Class activities (assignments/projects) require the preparation of technical reports and in-class presentations/discussions of own solutions. The use of Moodle and the relevant computer tools for developing technical reports is required. Class activities also require the identification and use of other technical literature beyond the textbook.	
Measured by: Class assignments and other class activities, technical reporting.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: Class assignments require the analysis as well as design of photovoltaic systems which in turn requires testing and design updating.	
Measured by: Class assignments, reports.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET 365: Power Electronics

Course Description: Credit 3 hours. Prerequisite: ET 226. An introduction to power electronic devices, circuits, and their applications. Topics include characteristics and analysis of power semiconductor devices, rectifier and switching power supply circuits, AC/DC, DC/AC converters, and computer modeling and simulation. (Spring)

Pre-requisite courses: ET 226: Electronics II

Minimum Topics Covered:

- BJT transistors
- Rectifiers (half and full wave)
- AC model of BJT
- MOSFET
- AC model of MOSFET
- Operational Amplifiers
- Regulators

Pre-requisite Topics:

- Boolean Algebra (CMPS 297)
- Logic Gates (CMPS 297)
- BJT (ET 225)
- Digital electronics (ET 226)

Objectives and Outcomes:

Students will be able to:

- Analyze a BJT circuit and study the different configurations and understand the significance of each configuration
- Find the small signal model of different BJT configurations
- Analyze MSOFET circuits
- Design voltage regulating circuits
- Design voltage clipping and voltage clamping circuits

Relevance to Job Market:

This class builds on several concepts covered in the Electronics I and II courses. It deals with the industrial application of such concepts and components. For instance, a diode which was introduced in a rectifying circuit is now used in a voltage regulating, clipping, and clamping circuits. Students seeking employment with companies dealing with boards in low and medium power ratings will find this course very beneficial. It prepares them to

deal with reverse engineering problems to design circuits capable of producing a specific output due to certain input(s).

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Lab assignments require use of protoboards, transistors, diodes, resistors, and capacitors.	
Measured by: Lab projects, tests.	
SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
Justification: Class assignments require the building, testing, and demonstration of working circuits to perform certain tasks (i.e. clipping circuit, negative clamping circuit, etc).	
Measured by: Lab projects, tests.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: Class assignments require the building of systems which in turn require testing using multimeters and oscilloscopes to observe the signals.	
Measured by: Lab projects, reports.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 371: Engineering Dynamics

Course Description: Credit 3 hours. An introduction to the study of kinematics and kinetics of particles, systems of particles, and rigid bodies, based on vector methods. Topics include rectilinear and curvilinear kinematics, kinetics in Cartesian, normal-tangential, and cylindrical frames, equations of motion, conservation of energy, work and energy methods. (Spring)

Pre-requisite courses: ET 205: Mathematical Methods for Engineering

Minimum Topics Covered:

- Rectilinear kinematics
- S-T, V-T, and A-T graphs
- Curvilinear kinematics and projectile motion
- Kinematics and kinetics in normal-tangential and cylindrical coordinates
- Pulleys and relative motion
- Newton's laws of motion and kinetics
- Work and energy principles

Pre-requisite Topics:

- Linear algebra: vectors, matrices, determinants
- Complex numbers
- Power Series (Maclaurin's series and Taylor's series) and applications
- Ordinary differential equations and applications

Objectives and Outcomes:

Students will be able to:

- Analyze motions using the Cartesian, cylindrical and other coordinate systems
- Get the knowledge of the concepts of rigid-body dynamics
- Understand the effect of forces on the motion of objects
- Understand the principles of work, energy, power, and mechanical efficiency

Relevance to Job Market:

A machine is defined as an energy converter and thus a machine usually has one or more moving parts. These moving parts cause a certain degree of acceleration, which results in inertia forces and moments. The effects of the inertia terms are the same as those of the static forces and moments. As a result, it is essential to include the

inertia terms in designing a machine or structure. This course teaches students the fundamentals of the dynamics (kinematics and kinetics); thus, the students learn how to analyze motion and determine the resulting acceleration in the Cartesian, tangential-normal, and polar (cylindrical) coordinates.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: In each class, this course solves various real-world examples of dynamic systems.	
Measured by: Class assignments, tests.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET 375: Applied Thermodynamics

Course Description: This course is designed to introduce students to the basic concepts of thermodnyamic systems and their application in real life situations. The course will develop students' ability to solve problems in thermodynamics. Topics covered include basic properties of gases, liquids and vapors, adiabatic and isothermal processes, energy and energy transfer mechanisms, thermodynamic analysis of simple, compressible systems, steam tables, and the performance characteristics of heat engines and heat pumps.

Pre-requisite courses: PHYS 191: General Physics
MATH 200: Calculus I

Minimum Topics Covered:

- Introduction to thermodynamic systems
- Energy: Changes, Transfers, Work and Heat Exchange in closed systems
- First law of Thermodynamics: Conservation of Energy; Cycle Analysis
- Equations of State; $P - v - T$ relationships for liquids and gases
- Evaluating properties, using liquid and vapor Tables of different thermodynamic substances
- Quality relationships
- Specific Heats (Heat capacities)
- Ideal Gas Equations of State; Polytropic process for an Ideal Gas
- Basic conservation of mass and conservation of energy calculations for control volumes
- Second Law of Thermodynamics statements and applications
- Power Cycle and Refrigeration/Heat Pump Cycle
- Basic calculations involving theoretical best performance, thermal efficiency, and coefficients of performance.

Pre-requisite Topics:

- Linear Algebra (MATH 175)
- Ordinary Integral & Differential Calculus (MATH 200)
- Basic Physics (PHYS 191)

Objectives and Outcomes:

Students will be able to:

- Understand the nature of different forms of energy and how they are exchanged between a thermodynamic system and its surroundings
- Evaluate the properties of liquid and vapor phases, using scientific techniques and engineering tables

- Determine the heat capacities of different substances
- Solve problems using the Ideal Gas Law when justified
- Solve problems involving the principles of conservation of mass and energy
- Solve problems involving simple engines, and refrigeration and heat pump cycles

Relevance to Job Market:

This is an introductory course that provides the mechanical and energy engineering technology student with an understanding of the methods and principles involved in the exchange of different forms of energy between an engineered system and its surroundings. These skills are required in solving real-life problems involving liquids and gases, for example in engines and heat pumps.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Thermodynamic concepts and principles are introduced in class mainly through quantitative problem-solving using real-life engineering problems. Classroom assignments and group problem-solving are used to emphasize the mathematical and scientific techniques necessary to solve problems involving actual engineering systems.	
Measured by: Quizzes, homework assignments, tests and final exam.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET376: Applied Fluid Mechanics

Course Description: Credit 3 hours. This course provides a comprehensive introduction to the basics of fluids and fluid mechanics as well as their applications in engineering and science. Topics include fluid statics and dynamics, fluid energy and flow measuring devices, fluid components and systems. (Fall)

Pre-requisite courses: ET 205 Mathematical Methods for Engineering

Minimum Topics Covered:

- Introduction and basic concepts
- Properties of fluid
- Fluid statics
- Fluid dynamics
- Mass, energy, and Bernoulli's equations
- Fluid flow
- Applications of fluids and fluid mechanics

Pre-requisite Topics:

- Linear algebra: vectors, matrices, determinants
- Complex numbers
- Power Series (Maclaurin's and Taylor's series) and applications
- Ordinary differential equations and applications

Objectives and Outcomes:

Students will be able to:

- Get the knowledge of the fundamental concepts of fluids.
- Understand the basic properties of fluids.
- Learn statics and dynamics of fluids
- Study behaviors and flow of fluids
- Get familiar with practical applications

Relevance to Job Market:

This class teaches the students the fundamentals of fluid statics and dynamics. In fluid statics students learn to apply fluid mechanics to the analysis and design of fluid systems such as a levee system and aquarium glass structure; in fluid dynamics students learn to apply fluid mechanics to the analysis and design of hydraulic systems which consist of fluid pumps, tubing, and actuators for given design criteria. Thus, this course prepares students to work in the local petroleum industry.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: This class teaches the students how to apply the fundamentals of fluid mechanics to the analysis and design of various fluid systems.	
Measured by: Class assignments, tests.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes
Justification: Class assignments require the testing and analysis of material properties such as viscosities and dynamic properties such as friction factors of tubing as functions of Reynolds numbers	
Measured by: Class assignments and tests.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 381: Strength of Materials

Course Description: Credit 3 hours. This course covers advanced topics in analysis of engineering materials and design of mechanical systems. Main focus will be given to mechanical behavior and mechanics of engineering materials, including fracture and failure as well as strength analysis. A laboratory fee is required for this course. (Fall)

Pre-requisite courses: ET 241: Introduction to Engineering Materials and ET 271: Engineering Statics

Minimum Topics Covered:

- Fundamentals of Strength of Materials:
  - Concept of Stress, Types of Stresses
- Design properties of materials
- Strain and Stress under Axial Loading
  - Axial Strain and Axial Deformation
  - Thermal deformation and stresses
- Elasticity of Materials
  - Modulus of Elasticity, Poisson's Ratio, Generalized Hook's Law
  - Modulus of Rigidity & Shearing Strain
- Stresses due to torsion
  - Torsional Shearing Stress
  - Angle of Twist
  - Design of Transmission Shafts
- Stresses due to Bending
  - Flexural Stress
  - Analysis and Design of Beams
- Transverse Shearing Stress
  - Analysis and Design of Beams
- Combined stresses
  - Transformation of Plane Stress
  - Principal Stresses & Maximum Shearing Stress
  - Mohr's Circle for Plane Stress
- Deflection of Beams
- Buckling of Columns

Pre-requisite Topics:

- Material Science (ET 241)
- Engineering Statics (ET 271)

Objectives and Outcomes:

Students will be able to apply the following principles to solve practical problems:

- Fundamental concepts of strength of materials
- Deformation, strain, stress and relationship among them
- Stresses due to different loading conditions and their combinations

- Principal Stresses and Maximum Shearing Stress
- Deflection of Beams
- Buckling of Columns

Relevance to Job Market:

This class teaches students fundamentals of strength of materials. It teaches them about evaluating the stresses and deformation resulting from applied loads and evaluating the safety of the design and/or performing re-design, if needed. It includes many examples relevant to what they see in their daily life and prepares them to analyze existing design for safety and design and re-design simple components for safe loading, which are some of the core workplace skills demanded for mechanical engineering technologists.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Class assignments require the use of mathematics and engineering concepts to solve stress and deformation analysis problems as well as design problems.	
Measured by: Class assignments, tests.	
SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
Justification: Class assignments require the performance of stress and deformation analysis and design simple components for safe loading based on different types of applied loads.	
Measured by: Class assignments, tests.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 385: Mechanical Design

Course Description: Credit 3 hours. Prerequisites: ET 381. This course covers kinematic analysis and design of mechanisms, analysis of machine elements in terms of mechanical behavior of materials, stress concentration, combined stresses, fracture, and fatigue. Traditional methods and Finite Element Modeling and Analysis (FEM/FEA) are used. A laboratory fee is required for this course. (Spring)

Pre-requisite courses: ET 381: Strength of Materials

Minimum Topics Covered:

- Linkages, cam systems, gear trains, and other mechanisms
- Material properties
- Principles of design and stress analysis
- Design for different types of loading (safety factors and reliability)
- Belt and chain drives
- Key, coupling, and seals

Pre-requisite Topics:

- Strength of Materials (ET 381)

Objectives and Outcomes:

Students will be able to:

- analyze and simulate mechanisms
- understand safety, reliability, and societal and fiscal aspects of design
- develop ability to analyze, design and/or select machine elements
- analyze fatigue, fracture, and cracks in design

Relevance to Job Market:

This class teaches students the principles of design of machine elements and mechanisms. It teaches the analysis and simulation of different mechanisms along with evaluating the stresses and deformation resulting from applied loads and verifying the safety of the design and/or performing re-design, if needed. It includes the procedure needed to design machine elements subjected to steady and fatigue stresses. The class covers many examples relevant to industry and prepares them to analyze existing design for safety and design and/or re-design various machine elements under different loading conditions, which are some of the core workplace skills demanded for mechanical engineering technologists.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Class assignments require the use of mathematics and engineering concepts to solve stress and deformation analysis as well as design problems.	
Measured by: Class assignments, tests.	
SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
Justification: Class assignments require the design and analysis of various machine elements used in engineering using traditional and FEA/FEM methods.	
Measured by: Class assignments, tests.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: Class assignments require the use traditional and FEA/FEM methods to design and analyze various machine elements and re-design them to meet the desired performance, reliability and safety.	
Measured by: Class assignments, reports.	
SO5	An ability to function effectively as a member or leader on a technical team.
Justification: Class assignments require the students to work in teams to analyze, simulate, and evaluate machine elements under various loading conditions.	
Measured by: Class assignments, reports.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 386: Machines and Control

Course Description: Credit 3 hours. ET 202 and 213. An introductory control and instrumentation course applied to machine control. Topics include electrical measurements and instrumentation, motors and generators and their control, feedback control systems, and programmable logic controllers. A laboratory fee is required for this course. (Fall)

Pre-requisite courses: ET 202: Computer Applications
ET 213: Electric Circuits

Minimum Topics Covered:

- Introduction to Machines and Control
- Flow charts
- Newton's second law and its applications to mechanical and electrical systems
- Mathematical modeling
- Computer simulation (MATLAB and SIMULINK)
- Stability analysis (root locus, phase margin, gain margin)
- Electrical systems
- Solenoids and Relays
- Transistor analysis
- Programming (Arduino)
- Build simple circuits and codes
- Motor Drives (DC, Servomotors, Stepper)
- Programmable Logic Controller PLC

Pre-requisite Topics:

- MATLAB (ET 202)
- Electrical circuit knowledge (ET 213)
- Ordinary Differential Equation (ET 205)

Objectives and Outcomes:

Students will be able to:

- Use graphical and calculation methods to study the stability of systems
- Construct hardware circuits to acquire inputs from transducers and to deliver outputs to actuators.
- Design switching circuits
- Design drive circuits with certain power requirements using electronics and controllers.
- Simulate systems using relevant software packages that are pertinent to control (MATLAB, SIMULINK).
- Build a ladder logic using PLC to perform certain sequence.

- Upload ladder logic to training modules and perform a pre-defined process.

Relevance to Job Market:

This class teaches students fundamentals of machines and control systems that are used in many industrial plants around our area. Also, students learn to design motor drive systems for embedded systems and for series of actuators. This course also teaches students about PLC and their programming using several modules and systems that are available in the lab to demonstrate the functionality of the ladder logics created. The surrounding workplace is heavily reliant on PLC to run machinery.

Relevance to Program Learning Outcomes and Evaluation:

SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
Justification: Class assignments require the building, testing, and demonstration of working prototypes of systems that meet specified design and performance targets.	
Measured by: Class assignments, projects.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: Class assignments require the building of systems which in turn requires testing and debugging to improve the design so as to attain specified performance.	
Measured by: Class assignments, tests, projects.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2020

Course Number and name: ET 400: Industrial Internship

Course Description: Credit: 1-6 hours. Student must be an integral part of an engineering project team in industry during the semester. Can be counted as technical elective only. (As Needed)

Pre-requisite courses: None, Junior or Senior standing and permission of the Department Head.

Minimum Topics Covered:

- Industrial skills & Hands-on Experience in relevant engineering field.

Pre-requisite Topics:

- None, Junior or Senior standing and permission of the Department Head.

Objectives and Outcomes:

Some of the specific objectives of the course are:

- To provide students with the opportunity to apply the knowledge gained in their coursework in an industrial environment.
- To provide students with an insight into the myriad of career opportunities available for Engineering Technology graduates.
- To provide students with experiences in establishing objectives and formulating plans to achieve those objectives.
- To provide students with the opportunity to develop their leadership abilities in an industrial environment.
- To provide students with an objective evaluation of their work traits through an external review of their individual performance while working in an industrial environment.

Relevance to Job Market:

The industrial internship is designed to provide an alternation of study on-campus and training off-campus as a superior form of education. Actual industrial experience is an integral part of the student's formal education, and theory is blended with practice. In addition to their regular classroom and laboratory experiences, students gain valuable experiences by working in an industrial environment.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Internship nature requires different methods of communications which will be evaluated through the student industrial supervisor by the end of the semester.	
Measured by: Internship Evaluation, industrial internship supervisor.	
SO5	an ability to function effectively as a member or leader on a technical team.

Justification: Industrial internships requires working in teams with other technical and non- technical team members. Qualities such as punctuality, flexibility, and respectfulness will be evaluated through the student industrial supervisor by the end of the semester.
Measured by: Internship Evaluation, industrial internship supervisor.

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 410: Signals and Systems

Course Description: Credit 3 hours. This course covers signal and system analysis. Topics include analysis techniques for signals and systems in both time and frequency domainIt discusses the modeling, simulation and response of dynamic systems using Laplace transform methods and introduces the response parameters of first and 2nd order system responses. It also covers the time and frequency responses of dynamic systems and gives introduction to feedback control. (Fall)

Pre-requisite courses: ET 202: Computer Applications and ET 205: Mathematical Methods for Engineering

Minimum Topics Covered:

- Introduction to Dynamic Systems
- Dynamic Response and Laplace Transform
- Modeling of Rigid-Body Mechanical Systems
- Spring and Damper Elements in Mechanical Systems
- Block Diagrams, State-Variable Models, and Simulation Methods
- Electrical and Electromechanical Systems
- System Analysis in the Time Domain
- System Analysis in the Frequency Domain (*)
- Introduction to Feedback Control Systems (**)

Pre-requisite Topics:

- Computer Applications: MATLAB (ET 202)
- Mathematical Methods for Engineering (ET 205)

Objectives and Outcomes:

Students will be able to:

- Model different dynamic systems in time and Laplace domain
- Find responses of dynamic systems to different inputs using Laplace transform
- Analyze and identify the parameters of responses of 1st and 2nd order systems
- Find and analyze the frequency response

Relevance to Job Market:

This class teaches students fundamentals of modeling and simulation of dynamic systems and finding their responses using traditional and simulation software like MATLAB, Simulink and Working Model 2D. This is important in many applications such as vibration analysis and electronic circuit stability. The course teaches how to assess system stability and prepare the student to use control strategies, in subsequent classes, to improve the responses.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Class assignments require the use of LaPlace transform and computational tools such as MATLAB and Simulink to analyze and find the responses of different dynamic systems.	
Measured by: Class assignments, tests.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: Class assignments require the use of simulation tools such as MATLAB, Simulink and Working Model 2D to construct/model dynamic systems, analyze them, and get their responses in time and frequency domain. Simulation results then can be used to improve the design to attain the desired performance.	
Measured by: Class assignments, tests.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 425: Control and Automation

Course Description: Credit 3 hours. This course covers control systems analysis and design. Topics include time and frequency domain modeling and response, actuators and sensors for controlling programmable logic controllers, design of compensators, and use MATLAB for control system analysis. A laboratory fee is required for this course. (Spring)

Pre-requisite courses: ET 205: Mathematical Methods for Engineering
ET 410: Signals and Systems

Minimum Topics Covered:

- Introduction to transducers and actuators
- Control theory:
  - Open loop systems
  - Feedback systems
- Transfer functions and Laplace transformation
- Root locus method
- Analysis of MATLAB control toolbox
- Stability analysis
- Motor drives
- Microcontrollers (Arduino) software and hardware construction
- Programmable Logic Controllers (PLC)

Pre-requisite Topics:

- MATLAB (ET 202)
- Ordinary Differential Equation (ET 205)
- Laplace Transformation and Mathematical Modeling (ET 410)

Objectives and Outcomes:

Students will be able to:

- Use graphical and calculation methods to study the stability of systems
- Code using C language with its functions, loops, and correct syntax
- Construct hardware circuits to acquire inputs from transducers and to deliver outputs to actuators.
- Design drive circuits with certain power requirements using electronics and controllers.
- Use relevant software packages that are pertinent to control (MATLAB, SIMULINK).
- Build a ladder logic using PLC to perform certain sequence.

Relevance to Job Market:

This class teaches students fundamentals of control systems that are used in many industrial plants around our area. Also, students learn to design motor drive systems for embedded systems. This course also teaches students about PLC and their programming using several modules and systems that are available in the lab to demonstrate the functionality of the ladder logics created.

Relevance to Program Learning Outcomes and Evaluation:

SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
Justification: Class assignments require the building, testing, and demonstration of working prototypes of systems that meet specified design and performance targets.	
Measured by: Class assignments, projects.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: Class assignments require the building of systems which in turn requires testing and debugging to improve the design so as to attain specified performance.	
Measured by: Class assignments, tests, projects.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 431: Power Transmission and Distribution

Course Description: Credit 3 hours. Prerequisites: Engineering Technology 214 or permission of Department Head. This course introduces fundamental concepts and systems related to generation, transmission, and distribution of AC and DC electrical power. Modeling and analysis of polyphase circuits, generators, motors, and transmission lines will be discussed.

Pre-requisite courses: ET 214: Electrical Circuits II, or permission of Department Head

Minimum Topics Covered:

- Overview of power systems
- Transmission line modeling and calculations
- Power flow and travelling waves on transmission lines
- Underground cables
- Faults and fault analysis; symmetrical and unsymmetrical faults
- Power-flow analysis
- Power systems control and stability
- Power systems protection

Pre-requisite Topics:

- Understanding of electrical circuits concepts (ET 214 or other experience)

Objectives and Outcomes:

Students will be able to:

- apply basic transmission line modeling and pertinent calculations
- explain transmission lines common faults
- apply principles of fault analysis
- apply principles of power-flow analysis
- demonstrate understanding of power systems control and stability principles
- demonstrate understanding of power systems protection methods

Relevance to Job Market:

This class teaches students the fundamentals and analysis of power systems distribution. It includes an analysis of power transmission lines (such as flow and faults) as well as the components of power transmission systems (such as generation, substations, protection equipment, cabling, etc). In this way it provides students with skills that are important to the power distribution industry which is a significant sector of the engineering technology job market.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Assignments require use of appropriate circuit analysis methods to analyze as well as to solve problems relevant to power transmission systems.	
Measured by: Class assignments, tests.	
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.
Justification: Class activities (assignments/projects) require the preparation of technical reports and in-class presentations/discussions of own solutions. The use of Moodle and the relevant computer tools for developing technical reports is required. Class activities also require the identification and use of other technical literature beyond the textbook.	
Measured by: Class assignments and other class activities, technical reporting.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 433: Wind Turbines

Course Description: Credit 3 hours. This course discusses fundamental concepts, technologies, applications, impacts, and economics of wind turbines. Topics include physical principles of wind energy conversion, wind blade and rotor aerodynamics, tower design, mechanical drive train, electrical and control systems, installation and maintenance, environmental issues, and costs of wind turbines. (Fall)

Pre-requisite courses: MATH 200: Calculus I and PHYS 191: Gen Physics, or permission of Department Head

Minimum Topics Covered:

- Overview of Wind Energy Business
- Basics of Wind Energy and Power
- Properties of Wind
- Aerodynamics of Wind Turbine Blades
- Advanced Aerodynamics of Wind Turbine Blades
- Wind Measurement
- Wind Resource Assessment
- Advanced Wind Resource Assessment
- Wind Turbine Generator (WTG) Components
- Basics of Electricity and Generators
- Deploying Wind Turbines in Grid
- Environmental Impact of Wind Projects
- Financial Modeling of Wind Projects
- Planning and Execution of Wind Projects

Pre-requisite Topics:

- Calculus I (MATH 200)
- General Physics (PHYS 191)

Objectives and Outcomes:

Students will be able to apply the following principles to solve practical problems:

- Physical principles of wind turbines
- Wind energy generation and transmission
- Factors affecting efficiency of wind turbines
- Design, fabrication, installation, operation and maintenance of wind turbines
- Environmental issues related to commercial wind turbines
- Cost and benefits analysis

Relevance to Job Market:

This class teaches students fundamentals of Wind Energy as one of the clean and renewable energy sources. The class covers various aspects of wind energy ranging from the theoretical background and aerodynamics design to the grid deployment and cost analysis.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Class assignments require the use of mathematical concepts along with computational tools such as Excel to analyze and design different aspects of wind turbines.	
Measured by: Class assignments, tests.	
SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
Justification: Class assignments and project require the students to consider design aspects for wind turbines and turn in assignments and projects that address all these elements.	
Measured by: Class assignments, reports.	
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.
Justification: Class assignments and project require the students to work in teams to design, simulate and build a prototype of a wind turbine with a given constraints and working conditions and present the results in oral and written formats.	
Measured by: Class assignments, reports.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes
Justification: Class assignments and project require the students to use available equipment and standard tests commonly used in the field to take measurements of wind turbine and calculate output and output efficiency.	
Measured by: Class assignments, reports.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 441: Construction Planning and Scheduling

Course Description: Credit 3 hours. Fundamentals of construction estimating procedures, with analysis of light commercial construction prints and specifications to determine the quantity of materials,

labor, equipment and overhead as well as profit as it relates to the bidding process. The use of traditional estimating practices and current computer software for the development of construction bids will also be discussed. (Spring)

Pre-requisite courses: Prerequisite: ET 132

Minimum Topics Covered:

- Overview of the Estimating and Bidding Process Quantity Takeoff
- Concrete, Masonry, Metals, Plumbing, HVAC, and Electrical
- Putting costs to the Estimate
- Ethics

Pre-requisite Topics: Project Professional and Visio

Course Objectives:

- To provide the student with the basic fundamentals of estimating in commercial and industrial architecture.
- To instill a confidence in the student to successfully estimate all phases of a building project.
- Discuss the procedures of determining quantities and the cost of performing the work

Relevance to Program Learning Outcomes and Evaluation:

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;

1.1 Uses appropriate tools to collect and analyze data
1.2 Follows scientific approach to solve broadly defined engineering problems

Justification: Lab assignment require the student to use the tools in the lab to estimate a residential building.
Such tools are Excel spread sheet, Visio, and Microsoft Project Professional, ect.

Measured by: Class work completed on different aspects of scheduling, and test

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

2.1 Uses appropriate methods and/or software to design components and systems
2.2 Uses evidence-based approach to validate design and analysis
2.3 Uses simulation software to test prototypes

Justification: Lab assignment require the student to use the tools in the lab to estimate a residential building.
Such tools are Excel spread sheet, Visio, and Microsoft Project Professional, ect.

Measured: Class work completed on different aspects of planning and scheduling, and test

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

4.1 Uses advanced software to interpret data (Excel, MATLAB, SolidWorks, COMSOL, etc)
4.2 Ability to use equipment and/or methods to perform tests common in the field
4.3 Ability to make improvements to a design on the basis of experimentation

Justification: The assignments are to produce a complete material estimate of a residential building.

Measured: Class work completed on different aspects of planning and scheduling, and test

SO 5 An ability to function effectively as a member or leader on a technical team.

5.1 Demonstrate traits conducive to team work (punctuality, flexibility, respectfulness)
5.2 Recognizes participant roles in a team setting and fulfills appropriate roles to ensure team success.

Justification: The assigned project is broken down into group activities, were a group of three or more student are assigned an activity to complete, in this group the student rotate around to different position so that each student understands what each aspect of in planning and scheduling of a building.

Measured: Class work completed on different aspects of planning and scheduling, and test

Relevance to Job Market;

The material and software taught in this class are important to the jobs that the students in ET Construction will encounter in the real working world.

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 442: Construction Inspection

Course Description: Credit 3 hours. This course discusses construction inspection, functions, responsibilities, authority and technical requirements related to construction industry. (Spring)

Pre-requisite courses: Prerequisite: ET 132

Minimum Topics Covered:

- The Construction Team
- Responsibility and Authority
- Safety on the Job
- Documentation: Records and Reports

Pre-requisite Topics: None

Course Objectives :

Become familiar with the fundamentals of Construction Inspection

- Develop basic skills in the use of records and reports in Construction Inspection
- Instill an attitude for accuracy in records and reports

Relevance to Program Learning Outcomes and Evaluation:

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;

1.1 Uses appropriate tools to collect and analyze data
1.2 Follows scientific approach to solve broadly defined engineering problems

Justification: Lab assignment require the student to use the inspection knowledge in the lab on a given a project. Such as reviewing and writing reports on construction methods.

Measured by: Class work completed, reports and test

SO 5 An ability to function effectively as a member or leader on a technical team.

5.1 Demonstrate traits conducive to team work (punctuality, flexibility, respectfulness)
5.2 Recognizes participant roles in a team setting and fulfills appropriate roles to ensure team success.

Justification: The assigned project is broken down into group activities, were a group of three or more student are assigned an activity to complete, in this group the student rotate around to different inspections so that each student understands what each aspect inspection is in the construction field.

Measured: Class work completed on different aspects of assignments, and test

Relevance to Job Market:

The understanding of what is involved with construction inspection is a key element in what the employer is looking for in an employee.

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 443: Foundation and Soil Mechanics

Course Description: Credit 3 hours. This course covers theory and application of soil properties, selection and methods of installation of foundations and other soil supported structures, including footings, piles, caissons, and retaining structures. (Spring)

Pre-requisite courses: ET 132: Construction Materials and Methods
ET 271: Engineering Statics

Minimum Topics Covered:

- Soil formation
- Soil exploration
- Grain size analysis of soil
- Atterberg limits
- Soil classification using ASSHTO and USCS systems
- Mass/Weight-Volume relationships of soil
- Water flow in soil
- Soil compaction
- Subsurface stresses and soil strength
- Bearing capacity and design of shallow foundations
- Overview of deep foundations
- Earth pressure and retaining structures

Pre-requisite Topics:

- Basic knowledge of construction process (ET 132)
- Force analysis, moments and dry friction (ET 271)

Objectives and Outcomes:

Students will be able to:

- Understand the factors affecting formation and transportation of soil
- Perform main soil classification tests performed in the laboratory
- Read and analyze the results of testing in standard soil reports
- Identify soil types and classification based on results of soil testing
- Perform and analyze standard compaction tests performed in laboratory and construction sites
- Design simple isolated footing and shallow foundations
- Differentiate between types of deep foundations and their characteristics
- Design and analyze retaining structures

Relevance to Job Market:

This class allow students to gin hands-on experience with most of the standard soil testing performed in construction industry. They are also trained to interpret and prepare soil reports. These can be essential for job opportunities in construction firms especially those in the fields of quality control, road/civil construction and foundations. The class also provide student with the knowledge necessary to design and analysis of shallow

foundation of residential and commercial buildings. Students also can check the safety of retaining structure used in different construction projects. The class provide the student with the basic knowledge about construction of shallow foundation and their uses which can be important for construction project with poor soil or special types of loading.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Class and Lab assignments require use of math, physics and other engineering knowledge to analyze test results and check foundations and retaining structures.	
Measured by: Class assignments, tests.	
SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
Justification: Class assignments require the design and analyze shallow foundation and retaining structures.	
Measured by: Class assignments, tests.	
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
Justification: Lab assignments require students to prepare technical report to present the results of testing performed in the lab and filed.	
Measured by: Class assignments, reports.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: In-class activites and labs require student to perform standard testing of soils and use the results to prepare graphs and tables showing these results and reach final conclusions	
Measured by: Class assignments, reports.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2019

Course Number and name: ET 478: HVAC (Heating, Ventilation, and Air Conditioning)

Course Description: Credit 3 hours. An introductory course in HVAC (heating, ventilation, and air conditioning). Topics include the fundamentals of refrigeration, basic refrigeration systems, metering devices, compression systems and compressors, AC motors and controls, refrigerants, charging HVAC systems, and heat load calculation. (Spring)

Pre-requisite courses: ET 375: Applied Thermodynamics
ET 386: Machines and Control

Minimum Topics Covered:

- Fundamentals of refrigeration
- Basic refrigeration systems
- Metering devices
- Compression systems and compressors
- AC motors and their controls
- Refrigerants
- Charging HVAC systems
- Heat load calculation

Pre-requisite Topics:

- Work, Heat, and Energy; first and second Law of thermodynamics (ET 375)
- Measurements; motors and generators; feedback control (ET 386)

Objectives and Outcomes:

Students will be able to

- Understand basic refrigeration systems
- Analyze the effects of the metering devices
- Get the knowledge of compression systems and compressors
- Understand how AC motors work and how to control them
- Characterize various refrigerants
- Charge various HVAC systems
- Calculate heat load

Relevance to Job Market:

This class teaches the students the fundamentals of HVAC systems. The students in this course learn how the engineering courses (fluid mechanics, thermodynamics, heat transfer, vibration and noise control, and AC motors and controls) are applied to the design of HVAC systems. This class training in HVAC system analysis helps the students design HVAC systems in their workplace.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: As mentioned above, the students learn how fluid mechanics, thermodynamics, heat transfer, vibration and noise control, AC motors and controls apply to the analysis and design of HVAC systems in an integrated way.	
Measured by: Class assignments and tests.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: Class assignments include lab experiments with an experimental heat pump system, which require the interpretation and analysis of the experimental data.	
Measured by: Class assignments and tests.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Spring 2020

Course Number and name: ET 484: Advanced Manufacturing Technologies

Course Description: This course covers special topics in manufacturing engineering and technology at an advanced level. Involvement of student in research survey of a specific manufacturing area of interest will be inlcuded if time permits.

Pre-requisite courses: ET 283: Manufacturing Processes

Minimum Topics Covered:

- Manufacturing Systems Overview
- Quantitative analysis of:
  a) Single Station Manufacturing Cells
  b) Group Technology and Cellular Manufacturing
  c) Flexible Manufacturing Systems
  d) Production Planning & Control

Pre-requisite Topics:

- Linear Algebra (MATH 175)
- Manufacturing Processes (ET 283)

Objectives and Outcomes:

Students will be able to:

- Understand the nature of key manufacturing systems used in engineering practice
- Perform quantitative analysis of different manufacturing systems, such as flexible manufacturing
- Understand the fundamental characteristics of production planning and control

Relevance to Job Market:

An understanding of the different systems of modern manufacturing is important for the mechanical engineering technology student who chooses a career in the manufacturing industry. This technical elective course provides the student with a broad overview of manufacturing systems, and teaches the student how to quantitatively analyze some key manufacturing systems for practical feasibility and cost efficiency.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: The concepts involved in manufacturing systems are emphasized by solving real-life problems in class and having class discussions about the decision-making process based on the results.	
Measured by: Homework assignments, tests and final exam.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET 488: Robotics and Automation

Course Description: Credit 3 hours. An introduction to robotics and automation. Topics include manipulators and mobile robotics, actuators and sensors, industrial control systems, and robot and system integration. Two hours of lecture and two hours of laboratory per week. A laboratory fee is required for this course. (As Needed)

Pre-requisite courses: Co-requisite: ET 386

Minimum Topics Covered:

- Vectors and space
- Projections of forces
- Forward and Inverse Kinematics
- Translation, Rotation, and Transformation
- Robotics configurations
- Denavit-Hartenberg representation
- Jacobian matrix

Pre-requisite Topics:

- Control and Automation (ET 386)
- Motor drives, motor selection (ET 386)
- programming of microcontrollers (ET 386)

Objectives and Outcomes:

Students will be able to:

- analyze forces in space and find projections on universal coordinates (i.e. Cartesian coordinates)
- calculate final destination of end effector based on a pre-defined set of joints' angles (forward kinematics)
- calculate required joint angles that would place the end effector on a specific location (inverse kinematics)
- translate, rotate, and transform frames attached to joints and end-effector to explain the manipulator's motion
- identify the universal robotic configurations
- identify the components of the D-H table and carryout the matrix multiplication to identify the overall translation and rotation of the robot
- construct the Jacobian matrix for variety of robotic configurations

Relevance to Job Market:

This class allows the students an opportunity to not only learn about robotic arms and their configurations, it also allows them to understand the deep analysis of how the motion is initiated and the effect of any motion on the

end-effector. Industries around our region rely heavily on robotic arms to perform repetitive tasks that require a high degree of accuracy. Knowledge about robots can improve students' job placement opportunities.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Classes and assignments will focus on vectors, space and linear algebra as basis to understand the more advanced topics such as transformation of frames.	
Measured by: Assignments, tests.	
SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
Justification: Class projects require building robotic arms that conform to standard robotic configurations and to analyze these configurations and to build D-H tables for them.	
Measured by: Lab projects, tests.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: Class assignments require the analysis of robotic configuration that will require forward and inverse kinematics to demonstrate that students understand the concepts of these techniques, such as trigonometric relations (law of sines, law of cosines, right angle theorem, etc)	
Measured by: Class assignments, reports.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET 490: Seminar

Course Description: Credit 1 hour. Prerequisite: ET 493. Discussion of social, ethical, and professional issues. Presentations and research on topics of current interest in engineering and technology. Grades assigned on a Pass/Fall basis only. (Fall, Spring)

Pre-requisite courses: Pre-requisites: ET 493

Minimum Topics Covered:

- Variety of topics that are pertinent to senior students in their senior design.
- Weekly lectures by professionals from different disciplines.
- Job placement opportunities with employers.
- Communication skills.

Pre-requisite Topics: Senior Design I (ET 493)

Course Objectives:

1. Students meet for invited lectures that are coordinated with the instructor of the course.
2. Students discuss issues that are current in their field of education.
3. Potential employers are invited to meet graduating candidates for job placement.
4. Students are trained on communication skills through open discussion topics.

Relevance to Job Market:

This class allows students to sharpen their technical information and keep them current on new topics in their fields of study through the subject matter experts invited to these lectures. They will also have the opportunity to meet with potential employers and seek advice from career service personnel who will also be invited to these meetings.

Relevance to Program Learning Outcomes and Evaluation:

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
Justification: Students need to use their skills and prepare a topic in coordination with the instructor. They will apply many elements in the presentations, including literature review, data presentation techniques, and analysis of results.	
Measured by: Discussions and presentations.	
SO5	An ability to function effectively as a member or leader on a technical team.

Justification: Students work together as part of the team with specific tasks to achieve an overall working model/system. They meet regularly with their advisor and manage their times together to meet and work on the deliverables of the projects.
Measured by: Discussion and presentations.

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET 492: Project Management

Course Description: This course covers the principles of project management for technologists and the use of project management software. Topics include the concepts involved in review techniques, network modeling, and the critical path method. In addition, linear programming and network optimization models with application to solve project management problems will be discussed.

Pre-requisite courses: Junior standing

Minimum Topics Covered:

- Project planning and scheduling, which includes network analyses, the critical path, project crashing, and time-cost trade-off.
- Linear programming and its application in decision-making.
- Capacity planning and aggregate production planning in manufacturing operations.
- Basic calculations involved in economic order quantity and inventory management.
- Solve problems and produce written and oral presentations.

Pre-requisite Topics: None (Junior standing required)

Objectives and Outcomes:

Students will be able to:

- Recognize the importance of performing quantitative analysis of projects to meet cost and time deadlines
- Develop and analyze project networks using standard project management techniques such as the critical path method
- Make probabilistic estimates of project duration using statistical analysis
- Understand the basic principle of linear programming and its application to decision-making by industry managers
- Apply the linear programming technique to solve project crashing problems
- Have a broad understanding of capacity planning, economic order quantity and inventory management

Relevance to Job Market:

Project planning and control is a necessary component of virtually all technology industries. This course teaches standard project management techniques, thus providing the student with a core skill set that is expected at the workplace.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: Students learn to use network analysis, statistical analysis, and linear programming techniques to develop, analyze and control example projects.	
Measured by: Group problem-solving in class, homework assignments, tests and final exam.	
SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
Justification: Students learn to use Microsoft Excel and Project to solve various project management and linear programming problems.	
Measured by: Class assignments, tests and final exam.	
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.
Justification: Students use project management software in addition to manual analysis techniques to solve problems.	
Measured by: Term papers.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET 493: Senior Design I

Course Description: Credit 3 hours. This course is the first part of the Capstone Design Project. It covers engineering ethics, teamwork and leadership, problem solving, oral and written technical communication, project management, and the integration of ET with real-world examples such as case studies in computer systems, robots, and mechatronics. All team projects are subject to instructor's approval. Two hours of lecture and two hours of laboratory per week. A laboratory fee is required for this course. (Fall, Spring).

Pre-requisite courses: Co-requisites: ET 492 and Senior standing

Minimum Topics Covered:

- Objectives of engineering design
- The stages of engineering design process
- Problem solving: definition, constraints, specifications and functions, and solutions in design space
- Prototypes, Models, and Computer simulations
- Intellectual Property – Notes
- Business principles - Notes
- Engineering ethics
- Teamwork and leadership
- Problem solving
- Oral and written technical communication
- Project management
- Basic calculations involved in economic order quantity and inventory management.

Pre-requisite Topics: Project Management (ET 492)
ET Concentration specific courses (guaranteed through the senior standing requirement)

Course Objectives:

1. Students have the 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 1.1, 1.2]

2. Students have the ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline [SO 2.1, 2.2, 2.3]

3. Students have the 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 [SO 3.1, 3.2, 3.3]

4. Students have the ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes [SO 4.1, 4.2, 4.3]

5. Students have the ability to function effectively as a member or leader on a technical team [SO 5.1, 5.2]

Relevance to Job Market:

This class allows students to reduce their knowledge into a practical application that is similar to the ones in the field. Students form teams and work under the supervision of an advisor. This is similar to work scenarios when employees are selected to serve on projects and achieve a unified goal. The teams and weekly meetings allow students to show their leadership skills and level of collaboration. Employees working on projects do not always deal with expected events, this is also the case in this class. Most of the projects have to seek alternative approaches to achieve solutions for the projects in hand. The class trains students on the communication and presentations skills as well. They will be pulled into meetings where they need to communicate to upper administration and/or clients how they system or project works.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: The capstone project will allow students to reduce the knowledge gained into a practical project with applications that are relevant to their field of study.	
Measured by: Projects assigned and reports	
SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
Justification: Project assigned will be relevant to each student's field of study and will touch on a topic that is current.	
Measured by: Projects assigned and reports	
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
Justification: Reports are required throughout the semester. Students are provided with a rubric and tips on how to write a report and the elements to include in that report.	
Measured by: Interim report, final report, presentations.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: Students work with the team members and their advisor to take measurements and run experiments to arrive at conclusions and/or to collect data.	

Measured by: Projects assigned, reports, presentations.	
SO5	An ability to function effectively as a member or leader on a technical team.
Justification: Students work together as part of the team with specific tasks to achieve an overall working model/system. They meet regularly with their advisor and manage their times together to meet and work on the deliverables of the projects.	
Measured by: reports, presentations, advisor's observation, and peer evaluation at the end of the course.	

SOUTHEASTERN LOUISIANA UNIVERSITY | Department of Industrial & Engineering Technology

Course Specifications Sheet
Fall 2019

Course Number and name: ET 494: Senior Design II

Course Description: Credit 3 hours. This course is the second part of the Capstone Design Project. It builds on and extends the themes covered in ET 493, culminating in a written Capstone Design Project and an oral presentation to the ET faculty and students at the end of the semester. The capstone project can take a variety of forms, such as analytical, computational, design-based, or experimental. Social, ethical, and professional issues as well as research on topics of current interest in engineering and technology will also be discussed. Two hours of lecture and two hours of laboratory per week. A laboratory fee is required for this course. (Fall, Spring)

Pre-requisite courses: Pre-requisites: ET 493 and Senior standing

Minimum Topics Covered:

- Objectives of engineering design
- The stages of engineering design process
- Problem solving: definition, constraints, specifications and functions, and solutions in design space
- Prototypes, Models, and Computer simulations
- Intellectual Property – Notes
- Business principles - Notes
- Engineering ethics
- Teamwork and leadership
- Problem solving
- Oral and written technical communication
- Project management
- Basic calculations involved in economic order quantity and inventory management.

Pre-requisite Topics: Senior Project I (ET 493)
ET Concentration specific courses (guaranteed through the senior standing requirement)

Course Objectives:

1. Students have the 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 1.1, 1.2]

2. Students have the ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline [SO 2.1, 2.2, 2.3]

3. Students have the 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 [SO 3.1, 3.2, 3.3]

4. Students have the ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes [SO 4.1, 4.2, 4.3]

5. Students have the ability to function effectively as a member or leader on a technical team [SO 5.1, 5.2]

Relevance to Job Market:

This class allows students to continue what they began in ET 493 (senior Design I) and build their prototype and test it. Students in this class move to the fabrication and the validation of their prototypes while maintaining a balance of quality, timeline, and cost of the project. These three factors are very intrinsic and determinant to any project and will be practiced through this class. Students will have the opportunity to present their project to an audience that is composed of industrial partners, peers, and faculty. They will receive feedback and have the opportunity to defend their choices. This is expected of them while dealing with upper administration and clients in the field.

Relevance to Program Learning Outcomes and Evaluation:

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.
Justification: The capstone project will allow students to reduce the knowledge gained into a practical project with applications that are relevant to their field of study.	
Measured by: Projects assigned and reports	
SO2	An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
Justification: Project assigned will be relevant to each student's field of study and will touch on a topic that is current.	
Measured by: Projects assigned and reports	
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
Justification: Reports are required throughout the semester. Students are provided with a rubric and tips on how to write a report and the elements to include in that report.	
Measured by: Interim report, final report, presentations.	
SO4	An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
Justification: Students work with the team members and their advisor to take measurements and run experiments to arrive at conclusions and/or to collect data.	

Measured by: Projects assigned, reports, presentations.	
SO5	An ability to function effectively as a member or leader on a technical team.
Justification: Students work together as part of the team with specific tasks to achieve an overall working model/system. They meet regularly with their advisor and manage their times together to meet and work on the deliverables of the projects.	
Measured by: reports, presentations, advisor's observation, and peer evaluation at the end of the course.	