APPENDIX A - COURSE SYLLABI

COURSE SYLLABUS

1. **ACS 1000 - Augustine and Culture Seminar: Ancients**

2. 3 credits, 3 contact hours (General Education Credits: 3)
   Three hour seminar per week

3. Course Coordinator: Dr. Gregory Hoskins

4. Text Books
   Plato, Symposium, trans. by Alexander Nehamas and Paul Woodruff (Hackett), ISBN: 0872200760.
   Augustine, Confessions, trans. Boulding (New City Press), ISBN: 1565481542.
   a. Other Supplemental Materials: Course Notes

5. Specific Course Information
   a. Catalog Description
      A Humanities seminar based principally on texts and readings drawn from primary sources up to 1650. Extensive written work and seminar discussions. Required readings: Hebrew and Christian scriptures, selections from the works of Augustine, Greek and Renaissance works. Readings from different genres and disciplines. Themes developed by the instructor in accordance with the selected readings.

   b. Prerequisites: None; Co-requisites: None

   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. Read and think critically; Write well; Excel in oral communication; Master cooperative learning skills; Apply new perspectives to your own ideas and values

7. List of Covered Topics
   1. Van Norden on hermeneutics
   2. Tolstoy
   3. Plato
   4. Aristotle on friendship
   5. Stoicism
   6. Hebrew Bible
   7. Gospel of Matthew
   8. Augustine
   9. Attar and Christine de Pizan

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Gregory Hoskins Date: 02/20/2020

1. **ACS 1001 - Augustine and Culture Seminar: Moderns**

2. 3 credits, 3 contact hours (General Education Credits: 3)
   Three hour seminar per week

3. Course Coordinator: Dr. Joseph Drury

4. Text Books
   Niccolo Machiavelli, *The Prince* (Penguin, ISBN: 9780140449150).
   William Shakespeare, *Richard III* (Penguin, 9780143130253).
   Jane Austen, *Pride and Prejudice* (Oxford, 9780199535569).
   Chinua Achebe, *Things Fall Apart* (Penguin, 9780385474542).
   a. Other Supplemental Materials: Course Notes

5. Specific Course Information
   a. Catalog Description
      A Humanities seminar based principally on texts and readings drawn from primary sources 1650 to the present. Extensive written work and seminar discussions. Readings from each of the following five historical eras: Early Modern, Enlightenment, Romantic, Modernist, Contemporary. Readings will also reflect different genres and disciplines. Themes developed by the instructor in accordance with the selected readings, including a specific Augustinian theme.
   b. Prerequisites: None; Co-requisites: None
   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. To provide a foundation in the humanities, which students can build upon in their major fields of study and their electives; To help students see the connections between the various disciplines of the humanities through the common study of primary texts and ideas; To advance the intellectual and moral mission of the College by introducing students to Christian and Augustinian traditions; To help students improve their skills in critical reading and inquiry, writing, speaking and listening

7. List of Covered Topics
   1. Self Reflections
   2. Critical Reflection
   3. Machiavelli
   4. Shakespeare
   5. John Locke
   6. Mary Wollstonecraft
   7. Jane Austen
   8. Midterm Paper
   9. Karl Marx & Friedrich Engels
   10. Frantz Fanon
   11. Chinua Achebe
   12. Final Paper

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Joseph Drury Date: 02/20/2020

COURSE SYLLABUS

1. **CHM 1103 - General Chemistry Laboratory I**

2. 1 credit, 3 contact hours (Mat/Sci Credits: 1)
   Three hour laboratory per week

3. Course Coordinator: Dr. Aimee Eggler

4. Text Book
   Experiments for CHM1103 General Chemistry I Laboratory.
   a. Other Supplemental Materials: Course Notes

5. Specific Course Information
   a. Catalog Description
      Qualitative and quantitative laboratory experiments which include: the reactions of metals with water; the collection and plotting of data; acid-base titrations; oxidation-reduction titrations; the use of the pH meter and the determination of acid-base titration curves; the use of the spectrophotometer.
   b. Prerequisites: None; Co-requisites: CHM 1131 or CHM 1151
   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. Students will learn foundational wet-lab chemistry techniques, including basic safe handling of chemicals, measurements of mass, volume, density, concentration, and pressure, and methods including filtration, titration, and observational analysis.

7. List of Covered Topics
   1. Laboratory Glassware
   2. Determining the Chemical Formula of a Compound
   3. Chemical Reactions
   4. Inorganic Synthesis
   5. Acid-Base Titration
   6. Gas Laws
   7. Solution Calorimetry and Thermochemistry
   8. Organic Synthesis, Purification, and Analysis
   9. Spectroscopy
   10. Selective Precipitation

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Aimee Eggler Date: 02/20/2020

1. **CHM 1151 - General Chemistry I**

2. 4 credits, 4 contact hours (Mat/Sci Credits: 4)
   Three hour lecture, one hour recitation per week

3. Course Coordinator: Dr. Thomas P. Umile

4. Text Book
   Chang & Overby, *Chemistry*, 13th ed.[Hardcover ISBN: 9781259911156, Loose-leaf ISBN: 9781260162035].
   a. Other Supplemental Materials: Course Notes

5. Specific Course Information
   a. Catalog Description
      Basic concepts of chemistry covering the topics: stoichiometry, redox reactions; properties of gases; thermochemistry; descriptive presentation of atomic orbitals; molecular structure and bonding; chemical trends in the periodic table; properties of bulk matter; colligative properties of solutions.
   b. Prerequisites: None; Co-requisites: CHM 1103
   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. Describe the atomic or molecular nature of solids, liquids, gases, pure substances, and mixtures; Predict the chemical and physical properties of a solid, liquid, gas, pure substance, or solution based on its atomic or molecular structure (and vice-versa); Identify common chemical reactions (acid/base, redox, and precipitation reactions) and qualitatively and quantitatively describe such reactions; Explain and analyze the relationships between the internal energy of a system, the work done by or on the system, and the heat energy absorbed or generated by the system.

7. List of Covered Topics
   1. The Atom
   2. Chemical Formulas
   3. Chemical Names
   4. Isotopes
   5. Percent Composition
   6. Stoichiometry
   7. Percent Yield
   8. Precipitation Reactions
   9. Acid/Base Reactions
   10. Redox Reactions
   11. Concentration
   12. Gas Relationships
   13. Ideal Gases
   14. Partial Gases
   15. Partial Pressures
   16. Real Gases
   17. Thermodynamics
   18. Calorimetry
   19. Heat of Reaction
   20. Quantum Chemistry
   21. Atomic Orbitals
   22. Electron Configurations
   23. Periodic Table
   24. Periodic Trends

25. Ionic & Covalent Bonds
26. Drawing Lewis Structures
27. Advantage Structure
28. Bond Enthalpy
29. VSEPR Theory
30. Advantage Bonding
31. Intermolecular Forces
32. Liquids
33. Phase Changes
34. Solutions
35. Colligative Properties

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Thomas P. Umile Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 1205 - ECE Freshman Projects**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture per week

3. Course Coordinator: Dr. Alan Johnston

4. Text Books
   N/A
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Project-based introduction to engineering course for freshman electrical and computer engineering majors.

   b. Prerequisites: ECE 1200; Co-requisites: None

   c. Required for B.S. Electrical Engineering

6. Course-specific Goals
   a. An exploration of the Electrical Engineering and Computer Engineering professions via hands-on projects including soldering.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X		X	X	X		

7. List of Covered Topics
   1. Electric Car Mini Project
   2. Soldering Project
   3. CubeSat Mini Project

Prepared by: Dr. Alan Johnston Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 1620 - Engineering Programming and Applications**

2. 3 credits, 4 contact hours (Engineering Topic Credits: 3)
   Two hour lecture & two hour lab per week

3. Course Coordinator: Dr. Richard Perry

4. Text Books
   Delores M. Etter, *Engineering Problem Solving with C*, 4th ed., Prentice Hall, 2013, ISBN: 978-0136085317
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Engineering problem solving using the C programming language, C control structures, data files, debugging, functions, arrays, elementary data structures, and pointers.
   b. Prerequisites: None; Co-requisites: None
   c. Required for B.S. Computer Engineering and Electrical Engineering

6. Course-specific Goals
   a. Learn how to create C programs to solve engineering problems. Learn how to use functions from the C library and how to create user-defined functions. Learn how to use arrays, structures, and pointers.
   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Constants and Variables
   2. Assignment Statements
   3. Standard Input and Output
   4. Mathematical Functions
   5. Control Structures
   6. Data Files
   7. Functions
   8. Arrays
   9. Pointers
   10. Structures

Prepared by: Dr. Richard Perry Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 2030 - Electric Circuits Fundamentals**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture per week

3. Course Coordinator: Dr. Alan Johnston

4. Text Books
   Ulaby, Maharbiz and Furse, *Circuit Analysis & Design*, Michigan Publishing, 2018.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Basic concepts, steady-state DC circuit analysis, network theorems, energy storage elements, complete response of first-order circuits, steady-state sinusoidal circuit analysis, AC systems.

   b. Prerequisites: None; Co-requisites: ECE 2031

   c. Required for B.S. Electrical Engg. and B.S. Computer Engg. (only for Class of 2021+)

6. Course-specific Goals
   a. Learn how to analyze electric circuits for voltage, current, and power with sources, resistors, inductors, and capacitors; Learn how to analyze circuits using a variety of techniques including Kirchhoff's Laws, Node Voltage Method, Mesh Currents, and Superposition; Learn how to analyze transient resistor/inductor and resistor/capacitor circuits; Learn how to analyze alternating current circuits using phasors, impedance, and complex power.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Basic Concepts
   2. Resistive Circuits
   3. Analysis Techniques
   4. Network Theorems
   5. Energy Storage Elements & Transient Behavior of First-Order Circuits
   6. AC Circuit Analysis
   7. Second-Order Circuits
   8. AC Power

Prepared by: Dr. Alan Johnston Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 2031 - Electric Circuits Fundamentals Lab**

2. 1 credit, 3 contact hours (Engineering Topic Credits: 1)
   Three hour lab per week

3. Course Coordinator: Dr. Alan Johnston

4. Text Books
   Ulaby, Maharbiz and Furse, *Circuit Analysis & Design*, Michigan Publishing, 2018.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Must be taken concurrently with ECE 2030. Laboratory exercises cover electrical safety and laboratory practice, basic instrumentation, computer-aided circuit analysis, and application of electronic devices.

   b. Prerequisites: MAT 1505; Co-requisites: ECE 2030

   c. Required for B.S. Electrical Engg. and B.S. Computer Engg. (only for Class of 2021+)

6. Course-specific Goals
   a. To become familiar with operating laboratory instrumentation, including power supplies, digital multimeters, signal generators and oscilloscopes; To become competent in building electric circuits and troubleshooting them to make them work successfully; To experimentally verify circuit concepts being learned in the theory section of the class; To learn about practical, real world issues in building electric circuits, interpreting schematic diagrams, and laying out circuits on a protoboard.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X		X			X	

7. List of Covered Topics
   1. Basic Concepts
   2. Resistive Circuits
   3. Analysis Techniques
   4. Network Theorems
   5. Energy Storage Elements & Transient Behavior of First-order Circuits
   6. AC Circuit Analysis
   7. Second-order Circuits
   8. AC Power

Prepared by: Dr. Alan Johnston Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 2042 - Fundamentals of Computer Engineering I**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture per week

3. Course Coordinator: Prof. Edward Char

4. Text Book
   B. LaMeres, *Logic Circuits & Logic Design with VHDL*, 2nd ed.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Introduction to logic design and digital computer fundamentals. Topics include computer arithmetic, Boolean algebra and logical design, assembly language programming basics, and basic concepts of computer architecture.

   b. Prerequisites: None; Co-requisites: ECE 2043

   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. To learn how to convert between Decimal, Binary, Octal, and Hexadecimal number systems; To learn how to design simple logic functions and common circuits; To understand what VHDL is used for and how to code circuits in it; To understand the differences between Sequential and Combinatorial design

   b.

Student Outcomes						
1	2	3	4	5	6	7
X					X	

7. List of Covered Topics
   1. Number Systems (Signed and Unsigned)
   2. Conversions
   3. Binary Arithmetic
   4. Combinatorial Digital Logic Design
   5. Sequential Digital Logic Design
   6. Counters
   7. State Machines
   8. VHDL

Prepared by: Prof. Edward Char Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 2043 - Fundamentals of Computer Engineering I Lab**

2. 1 credits, 3 contact hours (Engineering Topic Credits: 1)
   Three hour hands-on supervised practicum per week

3. Course Coordinator: Prof. Edward Char

4. Text Book
   B. LaMeres, *Logic Circuits & Logic Design with VHDL*, 2nd ed.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      The laboratory includes exercises on logic design and on programming the 68000 microprocessor in assembly language.

   b. Prerequisites: None; Co-requisites: ECE 2042

   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. To understand how to build logic circuits; To understand how to use Quartus to program in VHDL and troubleshoot code; To experimentally verify topics learned in the theory section of the class; To learn about practical real world experience in designing logic circuits

   b.

Student Outcomes						
1	2	3	4	5	6	7
X					X	

7. List of Covered Topics
   1. Number Systems (Signed and Unsigned)
   2. Conversions
   3. Binary Arithmetic
   4. Combinatorial Digital Logic Design
   5. Sequential Digital Logic Design
   6. Counters
   7. State Machines
   8. VHDL
   9. Lab 1 - Intro to Quartus
   10. Lab 2 - Combinatorial Circuit Design
   11. Lab 3 - Combinatorial Logic Design with VHDL
   12. Lab 4 - Sequential Circuit Design
   13. Lab 5 - Sequential Circuit Design with VHDL
   14. Lab 6 - Sequential Traffic Light Controller

Prepared by: Prof. Edward Char Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 2052 - Fundamentals of Electrical Engineering I**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture per week

3. Course Coordinator: Prof. Edward Char

4. Text Book
   F. T. Ulaby and M. M. Maharbiz, *Circuits*, 3rd ed., National Technology and Science Press.
   a. Other Supplemental Materials: None

5. Specific Course Information
   a. Catalog Description
      Basic concepts, steady-state DC circuit analysis, network theorems, ideal op-amp circuit analysis, energy storage elements, complete response of first-order circuits, steady-state sinusoidal circuit analysis and the phasor diagram.

   b. Prerequisites: MAT 1505; Co-requisites: ECE 2053

   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. (1) Understand how to solve DC circuits using KVL, KCL, Superposition, Mesh and Nodal Analysis, and Superposition containing independent and dependent power sources with resistors, capacitors, inductors and/or operation amplifiers
      (2) Understand how to solve AC circuits using phasor/sinusoidal analysis and the concept of leading and lagging signals.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. KVL, KCL
   2. Mesh & Nodal analysis
   3. Superposition
   4. Operational amplifiers in DC
   5. DC capacitors and inductors
   6. First order DC switching response
   7. Phasor and sinusoidal analysis

Prepared by: Prof. Edward Char Date: 05/21/2020

1. **ECE 2053 - Fundamentals of Electrical Engineering I Lab**

2. 1 credits, 3 contact hours (Engineering Topic Credits: 1)
   Three hour hands-on supervised practicum per week

3. Course Coordinator: Dr. Rosalind Wynne

4. Text Book
   F. T. Ulaby and M. M. Maharbiz, *Circuits*, 3rd ed., National Technology and Science Press.
   a. Other Supplemental Materials: None

5. Specific Course Information
   a. Catalog Description
      Must be taken concurrently with ECE 2052. Laboratory exercises cover electrical safety and laboratory practice, basic instrumentation, computer-aided circuit analysis, and applications of electronic devices.

   b. Prerequisites: MAT 1505; Co-requisites: ECE 2052

   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. (1) To become familiar with operating laboratory instrumentation, including power supplies, digital multimeters, signal generators and oscilloscopes.
      (2) To become competent in building electric circuits and troubleshooting them to make them work successfully.
      (3) To experimentally verify circuit concepts taught in the theory section of the class.
      (4) To learn about practical, real world issues in building electric circuits, interpreting schematic diagrams, and laying out circuits on a protoboard.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X		X			X	

7. List of Covered Topics
   1. Introduction to the lab and equipment
   2. Simple loop circuits and measurements
   3. KVL and KCL in multiloop circuits
   4. Wheatstone bridge
   5. Source transformations
   6. Thevenin Circuits, max power transfer
   7. Op Amps I
   8. Capacitance & inductance in DC
   9. Op Amps II & capacitance
   10. Capacitance & inductance in AC

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Rosalind Wynne Date: 05/23/2020

COURSE SYLLABUS

1. **ECE 2054 - Fundamentals of Electrical Engineering II**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture per week

3. Course Instructor: Mr. Jorge Rive

4. Text Book
   F. T. Ulaby and M. M. Maharbiz, *Circuits*, 3rd ed., National Technology and Science Press.
   a. Other Supplemental Materials: None

5. Specific Course Information
   a. Catalog Description
      Second-order circuits, complex-frequency (s-domain) analysis, network functions, RMS value, superposition of average power, maximum power transfer, frequency response (Bode) plots, AC power, balanced three-phase circuits, resonance, magnetically-coupled coils and the ideal transformer.

   b. Prerequisites: ECE 2052 and ECE 2053; Co-requisites: ECE 2055

   c. Required for B.S. Electrical Engineering

6. Course-specific Goals
   a. To understand how:
      (1) to analyze and solve AC second order circuits,
      (2) to create and read Bode plots,
      (3) to calculate AC power including three-phase,
      (4) transformers work.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Second order AC circuits
   2. RMS calculations
   3. AC power
   4. Bode Plots
   5. Transformers

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Mr. Jorge Rive Date: 05/23/2020

1. **ECE 2055 - Fundamentals of Electrical Engineering II Lab**

2. 1 credit, 3 contact hours (Engineering Topic Credits: 1)
   Three hour hands-on supervised practicum per week

3. Course Instructor: Dr. Finley Shapiro

4. Text Book
   F. T. Ulaby and M. M. Maharbiz, *Circuits*, 3rd ed., National Technology and Science Press.
   a. Other Supplemental Materials: None

5. Specific Course Information
   a. Catalog Description
      Laboratory projects in system design that employ both analog and digital electronic components and various types of input/output devices.

   b. Prerequisites: ECE 2052 and ECE 2053; Co-requisites: ECE 2054

   c. Required for B.S. Electrical Engineering

6. Course-specific Goals
   a. Student will be able to demonstrate understanding of topics taught in the ECE 2054 course. in a laboratory environment.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X		X			X	

7. List of Covered Topics
   1. Second order AC circuits
   2. RMS calculations
   3. AC power
   4. Bode Plots
   5. Transformers

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Finley Shapiro Date: 05/23/2020

COURSE SYLLABUS

1. **ECE 2290 - Engineering System Models and Control**

2. 4 credits, 5 contact hours (Engineering Topic Credits: 4)
   Three hour lecture, two hour lab per week

3. Course Coordinator: Dr. Stephen Konyk

4. Text Books
   Norman S. Nise, *Control Systems Engineering*, John-Wiley, Inc.
   a. Other Supplemental Materials: Class notes, Matlab

5. Specific Course Information
   a. Catalog Description
      Modeling and analysis of electrical, mechanical, and electromechanical systems; open-loop and feedback systems; frequency domain models; state equations; linearization, time response; steady-state error; block diagrams and signal flow graphs; stability criteria; root locust method. Practicm includes laboratory experiments involving actual engineering systems.

   b. Prerequisites: ECE 2030, ECE 2031, PHY 2402; Co-requisites: None

   c. Required for B.S. Electrical Engineering (for Class of 2021+)

6. Course-specific Goals
   a. To provide a foundation for the modeling, analysis and control of engineering systems which is based upon: the modeling and analysis of electrical, mechanical and electromechanical systems; open-loop and feedback systems; transform solutions, frequency domain models; state equations; linearization; time response; steady state error; block diagrams and signal flow graphs; stability criteria; and the root locus method.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Engineering Modeling and Control
   2. Transfer Functions and Differential Equations
   3. Transform Methods and Frequency Response
   4. State Variable Methods
   5. Time Response
   6. Feedback Systems
   7. Stability of Systems
   8. Root Locus Method

Prepared by: Dr. Stephen Konyk Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 2409 - Fundamentals of Matlab**

2. 2 credits, 3 contact hours (Engineering Topic Credits: 2)
   One hour lecture, two hours hands-on supervised practicum per week

3. Course Coordinator: Dr. Bijan G. Mobasseri

4. Text Book
   Matlab® Primer R2019a, © Copyright 2019 by The MathWorks, Inc.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Matlab is the premier numerical computation tool in many engineering disciplines. Topics include array and matrix operations, logical arrays and pointers, multidimensional data processing, 2D and 3D plotting, interpolation and curve fitting and string and character processing. The course ends with a capstone project.

   b. Prerequisites: None; Co-requisites: None

   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. The student will be able to write vectorized Matlab code to solve diverse engineering problems

   b.

Student Outcomes						
1	2	3	4	5	6	7
X		X			X	

7. List of Covered Topics
   1. Orientation and Introduction
   2. Arrays and Matrices I
   3. Arrays and Matrices II
   4. Logical Arrays and Pointers
   5. Multidimensional Arrays
   6. Color Control
   7. Linear Systems of Equations
   8. Line Plots
   9. Surface Plots
   10. THANKSGIVING RECESS
   11. Interpolation and Curve Fitting
   12. Characters and Strings
   13. PROJECT REVIEW
   14. READING DAY

Prepared by: Dr. Bijan G. Mobasseri Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 2430 - Embedded Systems I**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture per week

3. Course Coordinator: James Peyton Jones

4. Text Book
   S.L. Harris and D.M. Harris, *Digital Design and Computer Architecture (ARM Edition)*
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Introduction to logic design and digital computer fundamentals. Topics include computer arithmetic, Boolean algebra and logical design, basic concepts of computer architecture, programming and interfacing microcontrollers.

   b. Prerequisites: ECE 1620; Co-requisites: ECE 2431

   c. Required for B.S. Electrical Engineering (for class of 2021+)

6. Course-specific Goals
   a. The objective of this course is to introduce the students to embedded systems, focusing both on how to design and use them as well as on the principles on which they work.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Data Storage and Number Systems (Signed and Unsigned)
   2. Conversions and Binary Arithmetic
   3. Peripheral Devices (GPIO, A/D, PWM, Servo, Tone)
   4. Serial Communication (UART,SPI,I2C)
   5. Introduction to Boolean Expressions & Digital Logic
   6. Interrupts and Finite State Machines
   7. Cloud Programming
   8. Assembly Language Programming

Prepared by: James Peyton Jones Date: 05/15/2020

COURSE SYLLABUS

1. **ECE 2431 - Embedded Systems I Laboratory**

2. 1 credit, 3 contact hours (Engineering Topic Credits: 1)
   Three hour laboratory per week

3. Course Coordinator: James Peyton Jones

4. Text Book
   S.L. Harris and D.M. Harris, *Digital Design and Computer Architecture (ARM Edition)*
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      This laboratory course is intended to be taken concurrently with ECE 2430. The laboratory includes exercises on logic design and on programming and interfacing microcontrollers and programmable logic devices.

   b. Prerequisites: ECE 1620; Co-requisites: ECE 2430

   c. Required for B.S. Electrical Engineering (for class of 2021+)

6. Course-specific Goals
   a. The objective of this course is to introduce the students to embedded systems, focusing both on how to design and use them as well as on the principles on which they work.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Lab1: Digital Input/Output
   2. Lab2: 'Analog' Input/Output
   3. Lab3: Robot Control Project
   4. Lab4: Dealing with Events & Interrupts
   5. Lab5: Communicating with the Cloud
   6. Lab6: Serial Communications
   7. Lab7: Register Bit Manipulation
   8. Lab8: Finite State Machines
   9. Final Project: Burglar Alarm System

Prepared by: James Peyton Jones Date: 05/15/2020

COURSE SYLLABUS

1. **ECE 2530 - Analog Electronics I**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture per week

3. Course Coordinator: Dr. Nisha Kondrath

4. Text Books
   Streetman and Banerjee, *State Electronic Devices*, 7th. ed., Prentice-Hall, 2015.
   Sedra and Smith, *Microelectronics Circuits*, 7th ed., Oxford University Press, 2014.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Basic electronic concepts. Waves and particles, semiconductor device physics, diodes and BJT circuits and amplifier circuits.

   b. Prerequisites: ECE 2030, ECE 2031; Co-requisites: ECE 2531

   c. Required for B.S. Electrical Engineering (for class of 2021+)

6. Course-specific Goals
   a. Understand the fundamental physics behind the operation of any semiconductor device; Learn the principles of operation of several devices including the p-n diode, photodiodes, LEDs, and bipolar junction transistors; Design and analyze electronic circuits using diodes and bipolar junction transistors.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						X

7. List of Covered Topics
   1. Introduction to Semiconductors, Quantum mechanics
   2. Crystal Structures
   3. Charge Carriers, Concentrations in Semiconductors
   4. Introduction to Diodes
   5. Diode Circuits
   6. Zener Diode Circuits
   7. Diode Rectifier Circuits
   8. Introduction to BJTs
   9. BJT DC Circuits
   10. Amplifier Principles
   11. BJT Amplifier Circuits I
   12. BJT Amplifier Circuits II

Prepared by: Dr. Nisha Kondrath Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 2531 - Analog Electronics I Lab**

2. 1 credit, 2 contact hours (Engineering Topic Credits: 1)
   Two hour lab per week

3. Course Coordinator: Dr. Nisha Kondrath

4. Text Books
   N/A
   a. Other Supplemental Materials: Class notes, CAD software

5. Specific Course Information
   a. Catalog Description
      Must be taken concurrently with ECE 2530. Electronic circuit applications are investigated through laboratory design projects on semi conductor device physics, diodes and BJTs.

   b. Prerequisites: ECE 2030, ECE 2031; Co-requisites: ECE 2530

   c. Required for B.S. Electrical Engineering (for class of 2021+)

6. Course-specific Goals
   a. This laboratory will align with ECE 2530 to provide a measurement and simulation experience to compliment the lecture material. Simulation skills using LTSpice will help predict circuit performance, which will then be verified by measurements of a variety of electronic circuits using diodes and BJTs.

   b.

Student Outcomes						
1	2	3	4	5	6	7
		X			X	

7. List of Covered Topics
   1. Introduction to Semiconductors, Quantum mechanics
   2. Crystal Structures
   3. Diode I-V characteristics
   4. DC power supply
   5. BJT I-V characteristics
   6. BJT biasing circuits
   7. BJT common emitter amplifier

Prepared by: Dr. Nisha Kondrath Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 2550 - Introduction to Electronics and Applications**

2. 2 credits, 3 contact hours (Engineering Topic Credits: 2)
   One hour lecture, two hour lab per week

3. Course Coordinator: Dr. Nisha Kondrath

4. Text Books
   Sedra and Smith, *Microelectronics Circuits, 7th ed.*, Oxford University Press, 2014.
   a. Other Supplemental Materials:
      Neamen, *Microelectronics, Circuit Analysis and Design, 4th ed*, McGraw-Hill, 2010.
      Jaeger and Blalock, *Microelectronic Circuit Design, 3rd ed.*, McGraw-Hill, 2008.
      NI myDAQ module from National Instruments.

5. Specific Course Information
   a. Catalog Description
      Basic electronic concepts. Electronic circuit applications are investigated through the creation of laboratory design projects which address contemporary topics in Electrical Engineering.

   b. Prerequisites: ECE 2052; Co-requisites: None

   c. Required for B.S. Electrical Engineering (upto class of 2020).

6. Course-specific Goals
   a. The student will understand how to :
      (1) use computer aided simulation tools to design and analyze electronic circuits, and (2) prototype and troubleshoot board-level designs involving operational amplifiers, diodes, and bipolar junction transistors.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X		X			X	

7. List of Covered Topics
   1. Operational amplifier circuits
   2. Diode characteristics and circuits
   3. BJT characteristics
   4. A/D and D/A conversions
   5. Particle IO Photon
   6. Static Hazards
   7. Codes

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Nisha Kondrath Date: 05/24/2020

COURSE SYLLABUS

1. **ECE 2800 - Professional Development Seminar**

2. 2 credits, 3 contact hours (General Education Credits: 2)
   Three hour lecture per week

3. Course Coordinator: Dr. Stephen Konyk

4. Text Book
   N/A
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Various professional development activities including: initiation into mentoring program, introduction to engineering ethics and professional responsibilities, field trips and other events on contemporary issues, peer evaluation process, development of oral and written communication skills, workshops on a variety of professional skills.
   b. Prerequisites: None; Co-requisites: None
   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. Various professional development activities including: initiation into mentoring program, introduction to engineering ethics and professional responsibilities, potential field trips and other events on contemporary issues, peer evaluation process, development of oral and written communication skills, workshops on a variety of professional skills
   b.

Student Outcomes						
1	2	3	4	5	6	7
	X	X	X	X		X

7. List of Covered Topics
   1. Technical Communication
      a. Resume and Job Application Letter
      b. Electronic Mail and Etiquette
      c. Memoranda
      d. Technical Reports
      e. Elements of Effective Oral Presentation
   2. Out of Class Activities
      a. Career Fair Attendance
      b. Pitch Day & Senior Project Presentations
   3. Life-Long Learning
      a. Senior Electives
      b. Graduate School
      c. Continuing Education
      d. Performing Secondary Research
   4. Professional Practice
      a. Ethics in the Workplace
      b. Engineering Codes of Ethics
      c. Professional Societies
      d. Professional Licensure

e. Intellectual Property

5. Career Development
   a. Career Planning
   b. The Job Search
   c. Interviewing Techniques
   d. Networking
   e. Mentoring
   f. Project Management Skills
   g. Team-building Skills

Prepared by: Dr. Stephen Konyk

Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 3225 - Signal Processing**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture per week

3. Course Coordinator: Dr. Mojtaba Vaezi

4. Text Book
   Fawwaz T. Ulaby and Andrew E. Yagle, *Signals and Systems: Theory and Applications*, 2018.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      This course introduces the theory and practices of continuous and discrete time signals & systems analysis. Topics covered are signal representation and classifications, system representation and properties, linear time-invariant systems, convolution, various Fourier transforms, Laplace and z transforms, sampling, filtering and modulation.

   b. Prerequisites: ECE 2054, ECE 2409, MAT 2705; Co-requisites: None

   c. Required for B.S Electrical Engineering

6. Course-specific Goals
   a. Classify different types of signals and systems; Demonstrate an understanding of the properties of continuous time linear time-invariant (LTI) systems; Determine the response of an LTI system to an arbitrary input in both time and frequency domain; Apply Fourier series and transforms for signal and system analysis; Describe properties of discrete-time LTI systems; Define discrete-time signals and systems; Determine the response of a discrete-time LTI system to an arbitrary input in both time and frequency domain; Obtain the z-transform of a discrete-time signal; Characterize DTFT, DFT, FFT

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Signals
      a. Types of Signals
      b. Signal Transforms
      c. Waveform Properties
      d. Nonperiodic Waveforms
      e. Signal Power and Energy
   2. Linear Time-Invariant Systems
      a. Linear Time-Invariant Systems
      b. Impulse Response
      c. Convolution
      d. Graphical Convolution
      e. Causality and BIBO Stability
      f. LTI Sinusoidal Response
   3. Discrete-Time Signals and Systems

   a. Discrete Signal Notation and Properties
   b. Discrete-Time Signal Functions
   c. Discrete-Time LTI Systems
   d. Properties of Discrete-Time LTI Systems
   e. Discrete-Time Convolution
   f. The z-transform
   g. Properties of the z-transform
   h. Inverse z-transform
   i. System Transfer Function
   j. System Frequency Response
   k. Discrete-Time Fourier Transform (DTFT)
   l. Discrete Fourier Transform (DFT)
   m. Fast Fourier Transform (FFT)
4. Fourier Analysis Techniques
   a. Fourier Series Analysis Technique
   b. Fourier Series Representations
   c. Computation of Fourier Series Coefficients
   d. Parseval's Theorem for Periodic Waveforms
   e. Fourier Transform
   f. Fourier Transform Properties
   g. Parseval's Theorem for Fourier Transforms
   h. Circuit Analysis with Fourier Transform
5. Applications of the Fourier transform
   a. Filtering
   b. Modulation
   c. Sampling Theorem

Prepared by: Dr. Mojtaba Vaezi Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 3230 - Signal Processing Lab**

2. 1 credit, 3 contact hours (Engineering Topic Credits: 1)
   Three hour hands-on supervised practicum per week

3. Course Coordinator: Dr. Mojtaba Vaezi

4. Text Book
   Fawwaz T. Ulaby and Andrew E. Yagle, *Signals and Systems: Theory and Applications*, 2018.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      This practicum/lab will help students to gain hands on experience on basic signals and systems concepts using various types of simulated and real world engineering data. The practicums are deigned to help student get proficient in Matlab programming on topics related with continuous and discrete time signal and to get ready for signal processing and communication classes.

   b. Prerequisites: ECE 2409, MAT 2705; Co-requisites: ECE 3225

   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. To experiment with synthesizing and analyzing musical notes; To become familiar with Fourier/Spectral analysis of signals; To become familiar with some signal processing capabilities of MATLAB

   b.

Student Outcomes						
1	2	3	4	5	6	7
X		X			X	

7. List of Covered Topics
   1. Introduction to MATLAB
   2. Continuous-time and discrete-time signals using MATLAB
   3. Processing Audio Files
   4. Signal Operations using MATLAB
   5. Filtering/Echo Cancellation from an Audio Signal
   6. Convolution Sum and Correlation
   7. Discrete Time Fourier Transform (DTFT)
   8. z-Transform

Prepared by: Dr. Mojtaba Vaezi Date: 02/20/2020

1. **ECE 3430 - Embedded Systems II**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture per week

3. Course Coordinator: Dr. Jiafeng Xie

4. Text Book
   Brown and Vranesic, *Fundamentals of Digital Logic with VHDL Design*, 2nd or 3rd ed., McGraw-Hill.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Digital logic circuit implementation, simulation, and design utilizing reconfigurable logic circuits and hardware description languages.
   b. Prerequisites: ECE 2430, ECE 2431; Co-requisites: None
   c. Required for B.S. Electrical Engineering (for class of 2021+)

6. Course-specific Goals
   a. Be able to collaborate and communicate with classmates for corporate projects and tasks; To understand the properties of digital systems; To understand how to: 1. use computer aided simulation tools to design, analyze and synthesize digital circuits, 2. prototype and troubleshoot board-level and on-chip applications and designs involving timers, serial and parallel data circuits, and field programmable logic device circuits, 3. use computer aided simulation tools to design, analyze and synthesize digital circuits, 4. apply digital signal processing knowledge to practical systems, can model, design, and implement specific systems based on specific requirements, 5. prepare oneself as a qualified engineer for life-long learning and catch up rapid trend in technology
   b.

Student Outcomes						
1	2	3	4	5	6	7
X	X					

7. List of Covered Topics
   1. Introduction & VHDL
   2. VHDL & Properties of Digital Systems
   3. VHDL & MOS Digital Logic Circuits
   4. FPGA Technology & Digital Design
   5. Digital Design
   6. State Machines
   7. Memory
   8. System-Level Design

Prepared by: Dr. Jiafeng Xie Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 3450 - Digital Electronics**

2. 3 credits, 5 contact hours (Engineering Topic Credits: 3)
   Five Hour hands-on supervised practicum per week

3. Course Coordinator: Dr. Mark Jupina

4. Text Book
   Brown and Vranesic, *Fundamentals of Digital Logic with VHDL Design*, 2nd or 3rd ed., McGraw-Hill.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Digital logic families with primary emphasis on external electrical characteristics of the logic devices. Applications and designs at the board-level, involving topics such as series/parallel conversion and analog/digital conversion.

   b. Prerequisites: ECE 2030, ECE 2042; Co-requisites: None

   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. To understand the properties of digital systems; To understand how to use computer aided simulation tools to design, analyze and synthesize digital circuits; To understand how to prototype and troubleshoot board-level and on-chip applications and designs involving timers, serial and parallel data circuits, analog/digital conversion circuits, sensors, and field programmable logic device circuits

   b.

Student Outcomes						
1	2	3	4	5	6	7
X		X				

7. List of Covered Topics
   1. Properties of Digital Systems
   2. MOS Digital Logic Circuits
   3. Programmable Logic Technologies and VHDL
   4. Clocks, Schmitt Triggers, Timers, and One-Shots
   5. A/D and D/A Conversion
   6. State Machines
   7. Memory
   8. Data Buses and Data Paths

Prepared by: Dr. Mark Jupina Date: 02/20/2020

1. **ECE 3500 - Electronic Materials and Devices**

2. 4 credits, 6 contact hours (Engineering Topic Credits: 4)
   Three hour lecture, three hour lab per week

3. Course Coordinator: Dr. Rosalind Wynne

4. Text Book
   B. Streetman and S. Banerjee, *Solid State Electronic Devices*, 7th ed., Prentice-Hall, 2015.
   a. Other Supplemental Materials: Course notes, field trips

5. Specific Course Information
   a. Catalog Description
      Physics of crystal structures, energy bands, Fermi level, charge carriers, the p-n junction, and excess carriers. Devices: diodes, bipolar junction transistors and field effect transistors.
   b. Prerequisites: ECE 2051 or ECE 2054 or ECE 2510; Co-requisites: None
   c. Required for B.S. Electrical Engineering (upto class of 2020)

6. Course-specific Goals
   a. To understand the fundamental physics behind the operation of any semiconductor device; to learn the principles of operation of several devices including the p-n diode, photodiodes, LEDs, field effect transistors, and bipolar junction transistors.
   b.

Student Outcomes						
1	2	3	4	5	6	7
X					X	X

7. List of Covered Topics
   1. Semiconductor materials & devices
   2. Waves and particles; Planck's radiation Law
   3. Quantum mechanical concepts, mathematical representation, applications to simple systems, and practicum
   4. Semi-classical (Bohr) model of the atom
   5. Crystal structures & practicum
   6. Planes & directions in crystals
   7. Bonds & bands in semiconductors
   8. Semiconductor fabrication
   9. Charge carriers & concentrations in semiconductors
   10. Drift of carriers in electric & magnetic fields
   11. Field trip to U. Penn, Singh Center for nanotechnology
   12. Carrier diffusion; optical absorption; luminescence
   13. Photoconductivity; carrier recombination
   14. Continuity equation; Haynes-Shockley expt.
   15. P/N junction at thermal equilibrium, op-

toelectronic applic.
16. Hall Effect/Photoconductive detector practicum
17. Diodes: DC Analysis, reverse bias breakdown, AC/transient analysis
18. Metal-semiconductor junctions & heterojunctions
19. MESFET, HEMT, MOSFET, BJT, HBT
20. Extraction of transistor parameters

Prepared by: Dr. Rosalind Wynne Date: 05/21/2020

COURSE SYLLABUS

1. **ECE 3530 - Analog Electronics II**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture per week

3. Course Coordinator: Dr. Nisha Kondrath

4. Text Books
   A. S. Sedra and K. C. Smith, *Microelectronics Circuits*, 7th ed., Oxford University Press.
   Jaeger and Blalock, *Microelectronic Circuit Design*, 3rd ed., McGraw-Hill, 2008.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Analysis, design, and simulation of analog electronic circuits. Single and multistage amplifiers, amplifier frequency response, power amplifiers, linear and nonlinear op-amp circuits, active filters, oscillators, MOSFET, and CMOS circuits.

   b. Prerequisites: ECE 2530, ECE 2531; Co-requisites: None

   c. Required for B.S. Electrical Engineering (for class of 2021+)

6. Course-specific Goals
   a. Be introduced to basic operation and applications of operational amplifiers; Design electronic circuits using field-effect transistors; Analyze FET amplifier circuits and obtain frequency responses

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						X

7. List of Covered Topics
   1. Operational Amplifiers
   2. MOSFETs
   3. FET circuits in DC
   4. MOSFET amplifiers
   5. Small-signal Operation
   6. MOSFET amplifier biasing
   7. Discrete MOSFET amplifiers
   8. Amplifier Frequency Response
   9. Active Loading
   10. Current Mirrors
   11. Differential Amplifiers
   12. Multi-stage Amplifiers
   13. Op-Amp Circuits
   14. Power Amplifiers

Prepared by: Dr. Nisha Kondrath Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 3531 - Analog Electronics II Lab**

2. 1 credit, 3 contact hours (Engineering Topic Credits: 1)
   Three hour hands-on supervised practicum per week

3. Course Coordinator: Dr. Nisha Kondrath

4. Text Books
   A. S. Sedra and K. C. Smith, *Microelectronics Circuits*, 7th ed., Oxford University Press.
   Jaeger and Blalock, *Microelectronic Circuit Design*, 3rd ed., McGraw-Hill, 2008.
   a. Other Supplemental Materials: Class notes, CAD Software

5. Specific Course Information
   a. Catalog Description
      MOSFET DC Circuits, Device Parameter Extraction from BJT and MOSFET, Single and Multistage Amplifier Designs & frequency response, Power Amplifier Design with Thermal Design Considerations (Application of Heat Sinks).

   b. Prerequisites: ECE 2530, ECE 2531; Co-requisites: None

   c. Required for B.S. Electrical Engineering (for class of 2021+)

6. Course-specific Goals
   a. To provide a measurement and simulation experience to compliment the lecture material; Simulation skills using LTSpice will help predict circuit performance, which will then be verified by measurements of a variety of circuits, including operational amplifiers, both commercially packaged and ones that the student builds, as well as understanding MOSFET transistors and transistor amplifier circuits

   b.

Student Outcomes						
1	2	3	4	5	6	7
		X			X	

7. List of Covered Topics
   1. LTSpice Circuit Simulation
   2. Operational Amplifiers
   3. MOSFET Characteristics
   4. MOSFET DC Biasing Circuits
   5. MOSFET Amplifiers
   6. MOSFET Amplifier Frequency Response
   7. MOSFET Current Mirrors
   8. MOSFET Differential Amplifiers
   9. CMOS Operational Amplifier Demo

Prepared by: Dr. Nisha Kondrath Date: 02/20/2020

1. **ECE 3550 - Analog Electronics**

2. 4 credits, 5 contact hours (Engineering Topic Credits: 4)
   Three hour lecture, two hour practicum per week

3. Course Coordinator: Dr. Nisha Kondrath

4. Text Book
   Sedra and Smith, *Microelectronics Circuits, 7th ed.*, Oxford University Press, 2014.
   a. Other Supplemental Materials:
      Neamen, *Microelectronics, Circuit Analysis and Design, 4th ed*, McGraw-Hill, 2010.
      Jaeger and Blalock, *Microelectronic Circuit Design, 3rd ed.*, McGraw-Hill, 2008.

5. Specific Course Information
   a. Catalog Description
      Analysis, design, and simulation of analog electronic circuits. Single and multistage amplifiers, amplifier frequency response, power amplifiers, linear and nonlinear op-amp circuits, active filters, oscillators.

   b. Prerequisites: ECE 2051 or ECE 2054; Co-requisites: None

   c. Required for B.S. Electrical Engineering (upto class of 2020)

6. Course-specific Goals
   a. Students will learn:
      (1) to derive and apply small signal analysis on active analog circuits;
      (2) to design single and multistage transistor amplifier circuits using hand analysis and computer simulation (SPICE);
      (3) to understand tradeoffs between discrete versus integrated circuit design of active analog circuits;
      (4) to understand an Op Amp at the top level as a gain element to the transistor level and able to identify and design various sub-circuits including current sources, loads, references, and amplifiers; and
      (5) frequency response analysis of active circuits with reactive components.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X				X	X	

7. List of Covered Topics
   1. Diode circuits
   2. FET amplifiers
   3. Frequency response
   4. Current sources and active loads
   5. Differential & multistage amplifiers
   6. Op Amps

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Nisha Kondrath Date: 05/24/2020

COURSE SYLLABUS

1. **ECE 3690 - Engineering Electromagnetics**

2. 4 credits, 5 contact hours
   (Math/Sci Credits: 2; Engineering Topic Credits: 2)
   Three hour lecture, two hour lab per week

3. Course Coordinator: Dr. Ahmad Hoorfar

4. Text Books
   Shen, Liang Chi and Kong, Jin Au, *Applied Electromagnetics, 3rd ed.*, Brooks/Cole, 1995.
   a. Other Supplemental Materials: Over 300 pages of supplementary lecture notes

5. Specific Course Information
   a. Catalog Description
      Maxwell's equations, plane waves, dissipative media, reflection and transmission of waves at an interface, metallic and optical waveguides, transmission lines, linear and array antennas. Practicum includes computer projects, laboratory demonstrations and problem solving.

   b. Prerequisites: PHY 2412 and MAT 2500; Co-requisites: None

   c. Required for B.S. Electrical Engineering

6. Course-specific Goals
   a. The primary objective of this course is to understand the basic theoretical principles of classical time harmonic electromagnetic field theory as given by the Maxwell equations. This will be accomplished by studying certain canonical field structures such as plane waves, guided waves and radiation. Another objective is to apply these theoretical principles to engineering problems. Here this is accomplished by examining the example problems in the text, completing the homework problems and practicum/computer projects, following the example problems in class, and making assigned final presentations in various areas of modern communication and radar relevant to the course materials. A complete understanding of the fundamental principles is not found by the reading and memorization of equations and theorems alone, but rather from the repeated application of these principles to varied problems.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X		X	X			

7. List of Covered Topics
    1. Introduction, Complex and Vector Algebra
    2. Maxwell's Equations
    3. Electrostatics and Magnetostatics
    4. Uniform Electromagnetic Waves
    5. Wave Propagation in Lossy Media
    6. Boundary Conditions
    7. Reflection and Transmission of Waves
    8. Waveguides and Resonators
    9. Transmission Lines
    10. Smith Chart and Impedance Matching
    11. Antennas (if time permits)

Prepared by: Dr. Ahmad Hoorfar Date: 05/21/2020

COURSE SYLLABUS

1. **ECE 3720 - Engineering Probability and Statistics**

2. 3 credits, 3 contact hours (Mat/Sci Credits: 3)
   Three hour lecture per week

3. Course Coordinator: Dr. Stephen Konyk

4. Text Books
   Rodger E. Ziemer, *Elements of Engineering Probability & Statistics*, Latest Edition, Prentice Hall, Inc.
   a. Other Supplemental Materials: Class notes, Matlab, Excel

5. Specific Course Information
   a. Catalog Description
      Basic set theory, axioms of probability, probability relationships. Concepts of a random variable. Joint random variables. Selected topics in statistics from: estimation, hypothesis testing and regression. Selected topics from: functions of a random variable, random processes, Markov chains, applications (e.g. reliability, queuing, microprocessor control, digital communications, detection).

   b. Prerequisites: Junior EE or CPE standing; Co-requisites: None

   c. Required for B.S. Electrical Engineering and B.S Computer Engineering

6. Course-specific Goals
   a. To provide a foundation for probability theory and practice: Basic set theory, axioms of probability, probability relationships, concept of a random variable, joint random variables.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Probabilistic Framework and Motivation
   2. Probability Characterization and Properties
   3. Random Variable
   4. Joint Random Variables
   5. Statistics Framework and Motivation
   6. Estimation
   7. Random Processes
   8. Selected Topics

Prepared by: Dr. Stephen Konyk Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 3770 - Electrical Communications**

2. 4 credits, 5 contact hours (Engineering Topic Credits: 4)
   Three hour lecture, two hour lab per week

3. Course Coordinator: Dr. Mojtaba Vaezi

4. Text Books
   Simon Haykin and Michael Moher, *Communication Systems, 5th ed.*, John Wiley & Sons, 2009
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Analog and digital communications systems: characterization of communication channels, bandwidth and signal distortion; AM and FM, FM stereo and Dolby noise reduction; sample and hold, source encoding, matched filtering, digital modulations and error control coding. Practicum includes analysis and simulation of products such as compact discs and high speed modems.

   b. Prerequisites: ECE 3225 or ECE 3245, ECE 3720; Co-requisites: None

   c. Required for B.S. Electrical Engineering

6. Course-specific Goals
   a. Students will learn:
      (1) to compute the Fourier transform and power spectral densities of signals;
      (2) to apply FFT to analyze communication signals in MATLAB;
      (3) to explain the advantage and applications of various analog communication systems including, AM, DSB, SSB, and VSB;
      (4) how modulator/demodulator works for the above schemes;
      (5) about basic multiple access techniques in wireless communication;
      (6) the operation of basic digital communication systems (both baseband and bandpass) in both the time and frequency domains; and
      (7) to evaluate the performance (bit error rate) of digital communication systems.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Introduction and Mathematical Foundational
      i. Overview of early and current communication systems/history

   ii. Frequency domain analysis of signals and systems
   iii. Signal classification and operations
   iv. Signal distortion over communication channels
   v. Signal power
   vi. Energy
   vii. Spectral density
2. Analog Communications
   i. Analog signal transmission and reception
   ii. Amplitude modulation schemes
   iii. Angle modulation schemes
   iv. Frequency division multiplexing
3. Digital Communications
   i. Sampling theorem and the basis for digital communications
   ii. Quantization
   iii. Pulse modulation
   iv. Pulse code modulation
   v. Line coding
   vi. Reducing ISI
   vii. Digital carrier modulation
   viii. SNR
   ix. System performance

Prepared by: Dr. Mojtaba Vaezi Date: 05/23/2020

COURSE SYLLABUS

1. **ECE 3970 - Design Seminar - EE**

2. 2 credits, 3 contact hours (Engineering Topic Credits: 2)

3. Course Coordinator: Dr. Pritpal Singh

4. Text Books
   N/A
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Areas and career paths in computer and electrical engineering. Overview of required senior project courses and faculty project sponsors. Engineering design, project selection requirements, technical communications, information gathering. Requires selection of design project advisor, project topic, and a formal written project proposal.

   b. Prerequisites: None; Co-requisites: None

   c. Required for B.S. Electrical Engineering

6. Course-specific Goals
   a. To learn about the ECE design process, to acquire knowledge of project planning and proposal writing, to perform preliminary design work and write a formal technical proposal for continued design effort next Fall, to develop skills in working on a team. The minimum outcome expected from students is to be able to perform the following in a team setting: 1.) Develop design requirements and specifications for an open-ended design project. 2.) Learn and apply techniques for development and evaluation of design alternatives, including ethical considerations and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts and relevant standards. 3.) Learn and apply techniques for elementary program planning, scheduling, and management. 4.) Write an acceptable proposal for the design of a system, machine, or other which incorporates the first three items above, and successfully defend the proposal in an oral presentation.

   b.

Student Outcomes						
1	2	3	4	5	6	7
	X	X	X	X	X	X

7. List of Covered Topics

1. Electrical and computer engg. career paths
2. Project management (including scheduling, budgeting, resource management, etc.)
3. PC board layout software
4. Microcontroller programming/applications
5. Team Formation
6. Writing Technical Specifications
7. Project Decomposition
8. Proposal Development
9. Oral and written communication of proposals

Prepared by: Dr. Pritpal Singh Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 4290 - Engineering System Models and Control**

2. 4 credits, 5 contact hours (Engineering Topic Credits: 4)
   Three hour lecture, two hour lab per week

3. Course Coordinator: Dr. Stephen Konyk

4. Text Books
   Norman S. Nise, *Control Systems Engineering*, John-Wiley, Inc.
   a. Other Supplemental Materials: Class notes, Matlab

5. Specific Course Information
   a. Catalog Description
      Modeling and analysis of electrical, mechanical, and electromechanical systems; open-loop and feedback systems; frequency domain models; state equations; linearization, time response; steady-state error; block diagrams and signal flow graphs; stability criteria; root locust method. Practicum includes laboratory experiments involving actual engineering systems.

   b. Prerequisites: ECE 2051 or ECE 2054, and PHY 2402; Co-requisites: None

   c. Required for B.S. Electrical Engineering

6. Course-specific Goals
   a. To provide a foundation for the modeling, analysis and control of engineering systems which is based upon: the modeling and analysis of electrical, mechanical and electromechanical systems; open-loop and feedback systems; transform solutions, frequency domain models; state equations; linearization; time response; steady state error; block diagrams and signal flow graphs; stability criteria; and the root locus method.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Engineering Modeling and Control
   2. Transfer Functions and Differential Equations
   3. Transform Methods and Frequency Response
   4. State Variable Methods
   5. Time Response
   6. Feedback Systems
   7. Stability of Systems
   8. Root Locus Method

Prepared by: Dr. Stephen Konyk Date: 05/21/2020

1. **ECE 4810 - Introduction To Electrical Energy Systems**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture per week

3. Course Coordinator: Sam Brattini, P.E.

4. Text Book
   Ned Mohan, *First Course in Power Systems*, M5985, 2012, ISBN 978-1-118-07479-4.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      The purpose of the course is to show how electric energy is generated, transmitted, and distributed through the electrical power grid. Models of various components in the power system will be presented along with various analysis techniques. Course will include discussion of electric system history, environmental considerations, and electric energy delivery system future.

   b. Prerequisites: ECE 2030; Co-requisites: None

   c. Required for B.S. Electrical Engineering

6. Course-specific Goals
   a. To understand how electric power is generated, transmitted, and distributed in the US electrical grid; To understand high voltage transmission line operation; To understand power transformer operation; To understand synchronous generator operation; To understand the issues related to power system stability; To understand the issues related to the operation of the electric grid; To understand the issues related to power quality

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Introduction to Electric Energy Systems
   2. Review of AC Power, Phasors, Laws of Magnetism
   3. Energy & Environment
   4. AC Transmission Lines
   5. Transformers
   6. Power Generations
   7. Voltage Regulation and Power System Stability
   8. Power System Operation
   9. Energy Distribution and Power Quality

Prepared by: Sam Brattini, P.E. Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 4970 - Design Project - EE**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Meets just a few times as the whole group, most times are spent as teams with team advisors

3. Course Coordinator: Dr. Pritpal Singh

4. Text Book
   N/A
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Written and oral progress reports, demonstration of achieved objectives, formal written final report, oral presentation. Design groups meet weekly with their instructors.

   b. Prerequisites: Senior EE Standing; Co-requisites: None

   c. Required for B.S. Electrical Engineering

6. Course-specific Goals
   a. To allow completion of the Senior Design Project technical work that was planned and initiated in ECE 3970

   b.

Student Outcomes						
1	2	3	4	5	6	7
X	X	X	X	X	X	X

7. List of Covered Topics
   1. Three General Meetings
   2. Weekly Project Work Sessions
   3. 9 Progress Reports
   4. Technical Demonstrations
   5. Technical Executive Summary
   6. Individual Reflections on Team and Team-member Contributions

Prepared by: Dr. Pritpal Singh Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 4972 - Design Project Report - EE**

2. 1 credit, 2 contact hours (Engineering Topic Credits: 1)

3. Course Coordinator: Dr. Mark Jupina

4. Text Books
   N/A
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Preparation and presentation of a final written report and a formal presentation of each project team's senior design project completed in ECE 4970.
   b. Prerequisites: ECE 4970; Co-requisites: None
   c. Required for B.S. Electrical Engineering

6. Course-specific Goals
   a. The focus of the course is on technical communication skills using different formats: written, oral, and video briefs. To this end each senior design project team will prepare a joint Technical Project Report, a joint Oral Presentation, and a 3-minute Video of their project work.
   b.

Student Outcomes						
1	2	3	4	5	6	7
	X	X	X	X	X	X

7. List of Covered Topics
   1. Proper preparation of a technical project report
   2. Proper delivery of an oral presentation
   3. Video creation to demonstrate the purpose, value, and technical achievement of the project

Prepared by: Dr. Mark Jupina Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 5250 - Biomedical Instrumentation**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture/hand-on supervised lab per week

3. Course Coordinator: Dr. Meltem Izzetoglu

4. Text Book
   N/A
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Introductory course in Biomedical Engineering emphasizing human physiology & medical measurement tools & techniques. Topics include the nervous system, the cardiovascular system & the respiratory system.

   b. Prerequisites: None; Co-requisites: None

   c. Selected Elective for B.S. Computer Engg. and B.S. Electrical Engg.

6. Course-specific Goals
   a. Students will learn common biomedical signals and systems, their physiological origin, characteristics, modeling, and processing; Students will study various types of biosensors, transducers, bioelectrodes and amplifiers designed to acquire biomedical signals; Students will gain hands-on experience with biomedical signal acquisition and processing

   b.

Student Outcomes						
1	2	3	4	5	6	7
X				X	X	

7. List of Covered Topics
   1. Basic Concepts of Medical Instrumentation
   2. Electrical Circuitry, Filters, Amplifiers, and Signal Analysis
   3. Biopotentials
   4. Biomechanics
   5. Biomedical Acoustics
   6. Respiratory System
   7. Biomedical Optics

Prepared by: Dr. Meltem Izzetoglu Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 5251 - Biomedical Signal Processing**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture/hand-on supervised lab per week

3. Course Coordinator: Dr. Meltem Izzetoglu

4. Text Book
   N/A
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Signal processing of biomedical signals. Cardiac, neurological, & electromyographic signal processing. Biomedical signal filtering, frequency analysis, spectrum estimation & physiological information extraction.

   b. Prerequisites: EGR 2021; Co-requisites: None

   c. Selected Elective for B.S. Electrical Engg. and B.S. Computer Engg.; Biomedical Engg. Minor

6. Course-specific Goals
   a. Biomedical signals, origins, data collection and analysis methods
      Signal conditioning, and information extraction
      Students will learn pre- and post-processing steps in biomedical applications
      Students will, through examples, have exposure to basic biomedical signal processing applications

   b.

Student Outcomes						
1	2	3	4	5	6	7
X		X		X	X	

7. List of Covered Topics
   1. Overview of signals, systems and transform techniques,
   2. Pre-processing: filtering and filter design
   3. Processing in different Domains: Time vs Frequency
   4. Post-Processing: feature extraction, 1D & 2D signals
   5. Post-Processing: pattern recognition, clustering

Prepared by: Dr. Meltem Izzetoglu Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 5390 - Control System Design**

2. 4 credits, 5 contact hours (Engineering Topic Credits: 4)
   Three hour lecture, two hour lab per week

3. Course Coordinator: Dr. Stephen Konyk

4. Text Books
   Norman S. Nise, *Control Systems Engineering*, John-Wiley, Inc.
   a. Other Supplemental Materials: Class notes, Matlab

5. Specific Course Information
   a. Catalog Description
      Problem formulation, design techniques and evaluations, time domain and frequency domain design methods. Incorporates computer-aided analysis and design in conjunction with required laboratory projects.

   b. Prerequisites: ECE 4290 or ME 3103; Co-requisites: None

   c. Selected Elective for B.S. Electrical Engineering

6. Course-specific Goals
   a. Design and analysis of feedback control systems, formulation of the design problem, design techniques and judgments, compensator design, models and simulation methods, implementation and evaluation.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Time Domain Response and Simulation
   2. Frequency Domain Response and Simulation
   3. Sensor Models and Performance
   4. Electromagnetics in Linear Translation
   5. Electromagnetics in Rotational Translation
   6. Power Amplifier Applications
   7. Closed Loop Feedback Characteristics
   8. Root locus and compensation methods
   9. Frequency methods and stability
   10. PID Compensation
   11. Concept of State variables
   12. Feedback methodology
   13. Design with simulation
   14. Controller implementation

Prepared by: Dr. Stephen Konyk Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 5450 - Microcontroller Design and Applications**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture/hand-on supervised lab per week

3. Course Coordinator: Dr. Xun Jiao

4. Text Book
   Zhu, Yifeng, *Embedded Systems with ARM Cortex-M Microcontrollers in Assembly Language and C*, 3rd ed., E-Man Press LLC, 2017.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Through a combined lecture and laboratory environment, the students will be introduced to the concepts of ARM-based microcontrollers. These concepts will then be utilized, in the laboratory, to provide solutions to typical applications problems. Many applications problems will be assigned, and the students will be required to design and implement the solutions.

   b. Prerequisites: ECE 1620, ECE 2042, ECE 2043; Co-requisites: None

   c. Selected Elective for B.S. Computer Engg. and B.S. Electrical Engg.

6. Course-specific Goals
   a. Students will acquire knowledge of the various software and hardware components of a microcontroller; Students will gain understanding of MCU design and instruction set architecture (ISA); Students will be able to develop MCU applications using C language

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Introduction to MCU
   2. ARM Instruction Set Architecture
   3. Arithmetic/Logic and Load/Store
   4. Branch and Conditional Execution
   5. MCU Programming (Tools and Boards)
   6. Interrupt
   7. GPIO
   8. Timers
   9. Analog to Digital Conversion
   10. Step Motor Control
   11. Liquid Crystal Display (LCD) Interface
   12. Pulse Width Modulators
   13. Final Project Presentation

Prepared by: Dr. Xun Jiao Date: 02/20/2020

1. **ECE 5690 - Microwave Networks**

2. 4 credits, 5 contact hours (Engineering Topic Credits: 4)
   Three hour lecture and two hour hand-on supervised lab per week

3. Course Coordinator: Dr. Robert H. Caverly

4. Text Book
   D. Pozar, *Microwave Engineering*, 4th ed., 2011.
   a. Other Supplemental Materials: Course Notes, Laboratory Manual, CAD Software

5. Specific Course Information
   a. Catalog Description
      Modern communication systems, regardless of whether the system is primarily digital or analog, all require high frequency systems to extract or inject the appropriate signal into the transmission medium. The course objectives of ECE 5690 are to provide you with an introduction to the tools the modern microwave engineer uses in the analysis and design of microwave systems. These tools include a theoretical background in transmission lines and network theory as well as some solid-state devices, a knowledge of modern microwave simulation tools, and the ability to use, perform and understand microwave measurement equipment. Various in-class and out of class assignments will be used to help you in understanding and using these tools.

   b. Prerequisites: ECE 2054, ECE 3550, ECE 3690; Co-requisites: None

   c. Selected Elective for B.S. Electrical Engg. and B.S. Computer Engg.

6. Course-specific Goals
   a. Students will use design principles and the Smith Chart, and verify with CAD software; Students will design a variety of microwave power dividers and couplers; Students will use microwave laboratory equipment; Students will use modern microwave design and measurement techniques, software and instrumentation

   b.

Student Outcomes						
1	2	3	4	5	6	7
		X			X	

7. List of Covered Topics
   1. Transmission Line Theory
   2. Network Theory
   3. Practical Transmission Lines
   4. Directing Microwave Energy
   5. Microwave and RF System Fundamentals
   6. Microwave Diode Circuits

Prepared by: Dr. Robert H. Caverly Date: 02/20/2020

1. **ECE 5730 - RF Circuit Design**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture per week

3. Course Coordinator: Dr. Robert Caverly

4. Text Books
   D. Pozar, *Microwave Engineering, 4 ed.*, 2012.
   a. Other Supplemental Materials: Class notes, CAD software

5. Specific Course Information
   a. Catalog Description
      Design of active circuits and antennas for RF and wireless systems, including semiconductor control circuits, S-parameter based amplifier and oscillator design, mixers, and antennas for portable and base station applications. CAD tools and laboratory-based projects are emphasized.

   b. Prerequisites: ECE 5690; Co-requisites: None

   c. Selected Elective for B.S. Computer Engg. and B.S. Electrical Engg.

6. Course-specific Goals
   a. Upon completing the course, the student will:
      (1) be able to design and fabricate RF filter, amplifier and mixer circuits;
      (2) be able to use modern microwave/RF design packages such as Ansoft Designer, MOM-based Software, Ensemble, as well as other commercial and in-house codes to solve a variety of RF system and antenna problems;
      (3) learn the use of the Smith Chart to solve impedance transformation and impedance matching problems; and
      (4) be able to write technical reports based on the design, simulation and measurements microwave/RF circuits and antennas.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X	X	X			X	

7. List of Covered Topics
   1. System and Link Budget
   2. Advanced filtering topics
   3. Mixer design
   4. Amplifier design
   5. Oscillator design
   6. Antenna and signal control
   7. Antenna design and RF wave propagation

Prepared by: Dr. Robert Caverly Date: 05/22/2020

1. **ECE 5770 - Organs on a Chip**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture/lab per week

3. Course Coordinator: Dr. Rosalind Wynne

4. Text Books
   Lab-on-a-Chip Devices and Micro-Total Analysis Systems: A Practical Guide
   a. Other Supplemental Materials: Class notes, off-campus Soft-Lithography Facilities, off-campus 3D printing facilities

5. Specific Course Information
   a. Catalog Description
      Microfluidic electrochemical biomimetic systems as a physical micron-scale model of a human organ for sensing pharmaceutical, cosmetics, and food ingredients toxicology. Combine fundamentals of field effect circuits, optics, fluid mechanics, softlithography, and biochemistry with an emphasis on life sciences applications.

   b. Prerequisites: MAT 2705 or EGR 2021 or ECE 2530; PHY 1102 or PHY 2402 or PHY 2412; Co-requisites: None

   c. Selected Elective for B.S. Electrical Engg. and B.S. Computer Engg.

6. Course-specific Goals
   a. Students will examine the fluid dynamical phenomena underlying key components of "lab on a chip" devices. Students will have the opportunity to learn practical aspects of microfluidic device operation through hands-on laboratory experience and reviews of recent literature in the field. Throughout the course, students will consider ways of optimizing device performance based on knowledge of the fundamental fluid mechanics.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X	X					X

7. List of Covered Topics
   1. Microfluidics and Lab-on-a-Chip Devices: History and Challenges
   2. Basic Microfluidics Theory
   3. Design, Fabrication and Simulation of Lab-on-a-Chip Devices
   4. Fluidic Platforms and Components of Lab-on-a-Chip devices
   5. Microfluidic Electrochemical Biosensors: Fabrication and Applications
   6. Applications of Paper-Based Diagnostics
   7. Lab-on Fiber Technology

Prepared by: Dr. Rosalind Wynne Date: 02/20/2020

COURSE SYLLABUS

1. **ECE 5790 - Digital Signal Processing**

2. 4 credits, 5 contact hours (Engineering Topic Credits: 4)
   Three hour lecture, 2 contact hours lab per week.

3. Course Coordinator: Dr. Meltem Izzetoglu

4. Text Books (Recommended but not required):
   S. Haykin and B. Van Veen, *Signals and Systems*, John Wiley and Sons, 2005.
   A.V. Oppenheim and R.W. Schafer, *Discrete-Time Signal Processing*, Englewood Cliffs, NJ: Prentice Hall, 1989 (advanced).
   E.C. Ifeachor and B.W. Jervis, *Digital Signal Processing: A Practical Approach, 2nd ed.*, Prentice Hall, 2002.

5. Specific Course Information
   a. Catalog Description
      Review of discrete-time signals and systems; design and implementation of digital filters; Fast Fourier transform algorithms and applications; introduction to statistical signal processing; computer-aided design projects. Three lecture hours and a two-hour practicum per week.
   b. Prerequisites: ECE 3225 or ECE 3245; Co-requisites: None
   c. Selected Elective for B.S. Electrical Engg. and B.S. Computer Engg.

6. Course-specific Goals
   a. Students will have a better understanding of the theory of DSP
   b. Students will learn implementation tools and considerations which are most valuable for an introductory job in the DSP profession
   c. Students will gain experience in the design of DSP systems, and the mathematical tools used for such designs
   d. Students will implement DSP in Matlab; and
   e. Students will, through examples, have exposure to DSP applications.
   f.

Student Outcomes						
1	2	3	4	5	6	7
X		X			X	

7. List of Covered Topics

1. Review of signals & systems in continuous-time (CT)
2. Fundamentals of transform methods in CT
3. Sampling and quantization, A/D conversion
4. Review of signals & systems in discrete-time (DT)
5. Fundamentals of transform methods in DT
6. z-transform, system transfer function, Realizations
7. Fundamentals of transform methods in DT
8. Spectrogram
9. Introduction to filter design
10. Filter design by pole-zero placement
11. Basic filtering techniques: finite impulse response (FIR) & infinite impulse response (IIR) filters

Prepared by: Dr. Meltem Izzetoglu Date: 02/20/2020

COURSE SYLLABUS

1. **EGR 1001 - Career Compass First Year A**

2. 0.5 credits, online course with no scheduled contact hours ("Other" Credits: 0.5)

3. Course Coordinator: Frank Falcone

4. Text Book
   N/A

5. Specific Course Information
   a. Catalog Description
      First part of the professional development program for first year engineering students focused on four areas: The Engineering Profession, Setting the Stage for Personal Success, Post-Graduation Planning, and Communicating in the 21st Century.

   b. Prerequisites: None; Co-requisites: None

   c. Required for B.S. Computer Engineering and Electrical Engineering

6. Course-specific Goals
   a. Students will be able to describe some common engineering career paths; Students will explain the impact of the engineering profession on individuals and society; Students will describe the Competence, Courage, Integrity and Personal Accountability model of ethics; Students will better understand their personality strengths; Students will further develop skills needed for academic success; Students will further develop effective written and oral communication skills.

   b.

Student Outcomes						
1	2	3	4	5	6	7
	X	X	X	X		

7. List of Covered Topics
   1. Development of engineering as a profession
   2. Engineering benchmarks and their impact on society
   3. Introduction to ethics and professional character through the Competence, Courage, Integrity and Personal Accountability ethics model
   4. Introduction to Clifton Strengths and how this impacts interactions with others
   5. Time management skills
   6. Introduction to oral and written technical communication
   7. Preparation of a professional resume
   8. Interacting with Employers

Prepared by: Dr. Sarvesh Kulkarni; information supplied by Frank Falcone Date: 01/15/2020

COURSE SYLLABUS

1. **EGR 1002 - Career Compass First Year B**

2. 0.5 credits, online course with no scheduled contact hours ("Other" Credits: 0.5)

3. Course Coordinator: Frank Falcone

4. Text Book
   N/A

5. Specific Course Information
   a. Catalog Description
      Second part of the professional development program for first year engineering students focused on four areas: The Engineering Profession, Setting the Stage for Personal Success, Post-Graduation Planning, and Communicating in the 21st Century.

   b. Prerequisites: None; Co-requisites: None

   c. Required for B.S. Computer Engineering and Electrical Engineering

6. Course-specific Goals
   a. Students will explore the role of engineering and technology in society and the natural world; Students will recognize the value of professional engineering society membership; Students will further develop their team skills; Students will review the role of innovation in engineering; Students will formulate their career goals; Students will build technical presentation skills; Students will create a professional resume.

   b.

Student Outcomes						
1	2	3	4	5	6	7
	X	X	X	X		

7. List of Covered Topics
   1. The impact of science and engineering on society and the environment
   2. Resources available through professional engineering societies and the value of membership
   3. Team dynamics and its impact on group work
   4. The role of innovation and creativity in engineering problem solving
   5. Setting professional goals and working with a mentor
   6. Instruction on preparing and delivering technical presentations
   7. Resume format and content; resume review

Prepared by: Dr. Sarvesh Kulkarni; information supplied by Frank Falcone Date: 01/15/2020

COURSE SYLLABUS

1. **EGR 1200 - Engineering Interdisciplinary Projects I**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)

3. Course Coordinator: Dr. Andrea Welker, Dept. of Civil and Environmental Engineering

4. Text Books
   None
   a. Other Supplemental Materials: Laptop with MathCad, Matlab, Excel, Word, and Internet browser. Some projects may require additional software (provided).

5. Specific Course Information
   a. Catalog Description
      Core engineering concepts and project-based introduction to engineering course for freshmen engineering majors. First half of semester is lecture/project format emphasizing core concepts and math. Second half consists of an elective interdisciplinary project. Students choose from among several of these.

   b. Prerequisites: None

   c. Required for all engineering majors, including B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. Students will be able to: (1) understand what engineers do and describe their activities; (2) gain a basic understanding of the need to consider ethical implications in their schoolwork and in engineering; (3) begin to learn on their own and discover the need for life-long learning; (4) learn to act in a professional manner; (5) plan and manage a simple engineering project; (6) identify real-life constraints in a simple engineering project; (7) begin developing teamwork skills; (8) describe the processes of engineering modeling, analysis and design; (9) correctly use mathematical concepts such as units, accuracy, precision, error analysis, and significant figures when solving problems; (10) collect, organize, analyze, and present data and graphs from simple experiments.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X	X	X		X		X

7. List of Covered Topics

   1. Engineering as a profession and the engineering design process
   2. Engineering problem solving and computer-based calculations
   3. Systems and conversions of units and estimations

4. Analysis and modeling: conservation of momentum, mass, and energy
5. Time varying systems
6. Graphing and data presentation
7. Introduction to entrepreneurship

Prepared by: Dr. Noelle Comolli, Dept. of Chemical Engineering Date: 08/20/2019

COURSE SYLLABUS

1. **EGR 1205 - Engineering Interdisciplinary Projects II**
2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
3. Course Instructor: Prof. Edward Char
4. Text Books
   None
   a. Other Supplemental Materials: Provided notes
5. Specific Course Information
   a. Catalog Description
      Project-based introduction to engineering course for freshmen engineering majors. First half of semester consists of an elective interdisciplinary project. Students choose from among several of these. Second half consists of a program-specific series of topics.
   b. Prerequisites: EGR 1200
   c. Required for all engineering majors, including B.S. Computer Engineering and B.S. Electrical Engineering
6. Course-specific Goals
   a. An exploration of the Electrical Engineering and Computer Engineering professions via hands-on projects including soldering.
   b.

Student Outcomes						
1	2	3	4	5	6	7
		X	X	X		

7. List of Covered Topics
   1. Signal acquisition, filtering, and creation using Matlab
   2. Image processing using Matlab
   3. Soldering
   4. Audio Engineering

Prepared by: Prof. Edward Char Date: 05/21/2020

COURSE SYLLABUS

1. **EGR 2003 - Career Compass Second Year A**

2. 0.5 credits, online course with no scheduled contact hours ("Other" Credits: 0.5)

3. Course Coordinator: Frank Falcone

4. Text Book
   N/A

5. Specific Course Information
   a. Catalog Description
      First part of the professional development program for second year engineering students focused on four areas: The Engineering Profession, Setting the Stage for Personal Success, Post-Graduation Planning, and Communicating in the 21st Century.

   b. Prerequisites: None; Co-requisites: None

   c. Required for B.S. Computer Engineering and Electrical Engineering

6. Course-specific Goals
   a. Students will be introduced to Catholic Social Teaching and how it can be applied in the engineering profession; Students will be introduced to the interactions and skills used to solve complex engineering problems; Students will learn about interpersonal skills that can help build inclusive teams and enhance their professional performance; Students will be introduced to self-directed learning; Students will develop networking skills through interactions with a mentor; Students will improve their interviewing skills.

   b.

Student Outcomes						
1	2	3	4	5	6	7
	X	X	X	X		X

7. List of Covered Topics
   1. Catholic Social Teaching as an additional ethical guide that can direct engineering decisions
   2. The organization, communication and interpersonal skills required to address large and/or complex engineering problems
   3. Developing inclusive interactions in both personal and professional contexts
   4. Approaches to continued learning outside an academic environment
   5. Learning from graduates: networking and mentoring
   6. Effective interviewing skills and practice interview

Prepared by: Dr. Sarvesh Kulkarni; information supplied by Frank Falcone Date: 01/15/2020

COURSE SYLLABUS

1. **EGR 2004 - Career Compass Second Year B**

2. 0.5 credits, online course with no scheduled contact hours ("Other" Credits: 0.5)

3. Course Coordinator: Frank Falcone

4. Text Book
   N/A

5. Specific Course Information
   a. Catalog Description
      Second part of the professional development program for second year engineering students focused on four areas: The Engineering Profession, Setting the Stage for Personal Success, Post-Graduation Planning, and Communicating in the 21st Century.

   b. Prerequisites: None; Co-requisites: None

   c. Required for B.S. Computer Engineering and Electrical Engineering

6. Course-specific Goals
   a. Students will appreciate the diversity of engineering companies and organizations; Students will apply the Competence, Courage, Integrity and Personal Accountability model of ethics; Students will learn about interpersonal skills that help build inclusive teams and enhance their professional performance; Students will interact with a mentor and plan steps for their professional growth; Students will understand the need for proactive career planning.

   b.

Student Outcomes						
1	2	3	4	5	6	7
	X	X	X	X		

7. List of Covered Topics
   1. The wide range of companies and career opportunities available to engineers
   2. Application of the Competence, Courage, Integrity and Personal Accountability model of ethics
   3. Inclusive teams and the benefits of diversity
   4. Learning from graduates: networking and mentoring
   5. Taking responsibility for one's career growth
   6. Further development of team skills

Prepared by: Dr. Sarvesh Kulkarni; information supplied by Frank Falcone Date: 01/15/2020

COURSE SYLLABUS

1. **EGR 3005 - Career Compass Third Year A**

2. 0.5 credits, online course with no scheduled contact hours ("Other" Credits: 0.5)

3. Course Coordinator: Frank Falcone

4. Text Book
   N/A

5. Specific Course Information
   a. Catalog Description
      First part of the professional development program for third year engineering students focused on four areas: The Engineering Profession, Setting the Stage for Personal Success, Post-Graduation Planning, and Communicating in the 21st Century.

   b. Prerequisites: None; Co-requisites: None

   c. Required for B.S. Computer Engineering and Electrical Engineering

6. Course-specific Goals
   a. Students will appreciate opportunities for advanced education and alternative career paths; Students will value self awareness as a tool for guiding decisions; Students will learn about conflict resolution and other interpersonal skills; Students will further develop networking skills through interactions with a mentor; Students will improve oral presentation skills.

   b.

Student Outcomes						
1	2	3	4	5	6	7
	X	X	X	X		X

7. List of Covered Topics
   1. Career paths within engineering
   2. Opportunities for advanced education
   3. Self awareness as an input to determining career goals
   4. Interpersonal skills for personal and professional success
   5. Learning from graduates: options after graduation, conflict resolution
   6. Public speaking and presentation skills

Prepared by: Dr. Sarvesh Kulkarni; information supplied by Frank Falcone Date: 01/15/2020

COURSE SYLLABUS

1. **EGR 3006 - Career Compass Third Year B**

2. 0.5 credits, online course with no scheduled contact hours ("Other" Credits: 0.5)

3. Course Coordinator: Frank Falcone

4. Text Book
   N/A

5. Specific Course Information
   a. Catalog Description
      Second part of the professional development program for third year engineering students focused on four areas: The Engineering Profession, Setting the Stage for Personal Success, Post-Graduation Planning, and Communicating in the 21st Century.

   b. Prerequisites: None; Co-requisites: None

   c. Required for B.S. Computer Engineering and Electrical Engineering

6. Course-specific Goals
   a. Students will gain further understanding of Catholic Social Teaching and how it can be applied in the engineering profession; Students will strengthen their resume and interview skills; Students will interact with a mentor and consider their work/life balance; Students will plan steps for their professional growth; Students will improve their oral presentation skills.

   b.

Student Outcomes						
1	2	3	4	5	6	7
	X	X	X	X		X

7. List of Covered Topics
   1. Catholic Social Teaching as an additional ethical guide that can direct engineering decisions
   2. Resume development
   3. Learning from graduates: work/life balance
   4. Taking responsibility for one's career growth
   5. Public speaking and presentation skills

Prepared by: Dr. Sarvesh Kulkarni; information supplied by Frank Falcone Date: 01/15/2020

COURSE SYLLABUS

1. **MAT 1500 - Calculus I**

2. 4 credits, 4 contact hours (Mat/Sci Credits: 4)
   Three hour lecture, one hour recitation per week

3. Course Coordinator: Ms. Maria Baranski

4. Text Book
   James Stewart, *Calculus: Early Transcendentals*, 8th ed.
   a. Other Supplemental Materials: Course Notes

5. Specific Course Information
   a. Catalog Description
      Limits, transcendental functions (logarithms, exponential functions, inverse trigonometric functions), differentiation (definition, tangent lines, rates of change, techniques, implicit differentiation, related rates), applications of differentiation (graphing, optimization), indeterminate forms and L'Hopital's Rule. Use of a computer algebra system, eg. MAPLE.

   b. Prerequisites: None; Co-requisites: None

   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. Students will understand the definition of the derivative and know standard differentiation techniques in order to apply the tools of calculus to the solution of real-world problems.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Functions and Models
   2. Limits and Derivatives
   3. Differentiation Rules
   4. Applications of Differentiation
   5. Integrals

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Ms. Maria Baranski Date: 03/17/2020

COURSE SYLLABUS

1. **MAT 1505 - Calculus II**

2. 4 credits, 4 contact hours (Mat/Sci Credits: 4)
   Three hour lecture, one hour recitation per week

3. Course Coordinator: Dr. Robert Jantzen

4. Text Book
   James Stewart, *Calculus Early Transcendentals*, 8th ed.
   a. Other Supplemental Materials: Course Notes

5. Specific Course Information
   a. Catalog Description
      Integration (indefinite, definite), applications of integration (area, volume, applications to physics and economics, etc.), methods of integration, approximate integration (trapezoidal and Simpson's rules), improper integrals, differential equations, infinite sequences and series. Continued use of a computer algebra system.

   b. Prerequisites: MAT 1500; Co-requisites: None

   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. The student will receive a standard introduction to integral calculus and related topics, become familiar with integration techniques, and applications of integration including area and volume, and improper integrals. The student will also be able to understand and solve differential equations, infinite sequences and series.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Integrals
   2. Applications of Integration
   3. Techniques of Integration
   4. Further Applications of Integration
   5. Infinite Sequence and Series
   6. Parametric Equations and Polar Coordinates
   7. Differential Equations

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Robert Jantzen Date: 03/17/2020

COURSE SYLLABUS

1. **MAT 2500 - Calculus III**

2. 4 credits, 4 contact hours (Mat/Sci Credits: 4)
   Four hour lecture per week

3. Course Coordinator: Dr. Kathleen Acker, Dept. of Mathematics

4. Text Books
   J. Stewart, *Calculus: Early Transcendentals, 8th ed.*, Brooks/Cole, 2015.
   a. Other Supplemental Materials: Maple, Computer Algebra Software; WebAssign From Cengage, a digital teaching and learning tool.

5. Specific Course Information
   a. Catalog Description
      Parametric equations; polar, cylindrical, and spherical coordinates; vectors and the geometry of space; vector functions (derivatives, integrals, curvature, etc.); partial derivatives; optimization; multiple integration and its applications; vector calculus (line integrals, vector analysis). Continued use of a computer algebra system.

   b. Prerequisites: MAT 1505 (Calculus II); Co-requisites: None

   c. Required for B.S. Electrical Engineering; Selected Elective for B.S. Computer Engineering

6. Course-specific Goals
   a. Students will understand (1) the definitions of partial derivatives and multiple integrals and know standard techniques in order to apply the tools of multivariable calculus to the solution of real-world problems, and (2) parametric equations, alternative coordinate systems, and vector functions to apply to real-world problems.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Parametric equations
   2. Polar, cylindrical, and spherical coordinates
   3. Vectors and geometry of space
   4. Vector functions (derivatives, integrals, curvature, etc.)
   5. Partial derivatives
   6. Optimization
   7. Multiple integration and applications
   8. Vector calculus (line integrals, vector analysis)
   9. Continued use of the computer algebra system Maple

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Kathleen Acker Date: 05/21/2020

COURSE SYLLABUS

1. **MAT 2705 - Differential Equations with Linear Algebra**

2. 4 credits, 4 contact hours (Mat/Sci Credits: 4)
   Three hour lecture, one hour recitation per week

3. Course Coordinator: Dr. Kaitlyn Muller

4. Text Book
   Edwards and Penney, *Differential Equations and Linear Algebra*, 4th ed. or Villanova ed. 3.
   a. Other Supplemental Materials: Course Notes

5. Specific Course Information
   a. Catalog Description
      First order and linear second order differential equations, matrices and linear equation systems, eigenvalues and eigenvectors, and linear systems of differential equations.

   b. Prerequisites: MAT 1505; Co-requisites: None

   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. Students will understand the basic techniques for the solution of certain classes of differential equations in order to apply the tools to the representation and solution of real-world problems. They will understand the basic definitions and calculations of linear algebra and use linear algebra techniques in the solution of linear systems of differential equations.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. First Order Equations
   2. Mathematical Models
   3. Introduction to Linear Algebra and Matrices
   4. Linear Systems of ODEs
   5. Linear Equations of Second Order
   6. Nonlinear Systems
   7. Numerical Methods

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Kaitlyn Muller Date: 02/18/2020

1. **PHY 2400 - Physics I: Mechanics**

2. 3 credits, 3 contact hours (Mat/Sci Credits: 3)
   Three hour lecture per week

3. Course Coordinator: Dr. Christopher Brown

4. Text Book
   Randall D. Knight, *Physics for Scientists and Engineers: A Strategic Approach*, 4th ed., 2017.
   a. Other Supplemental Materials: License to access Pearson's "Mastering Physics"

5. Specific Course Information
   a. Catalog Description
      Introduction to Mechanics. Designed for students in the College of Engineering.
   b. Prerequisites: Math 1500 or equivalent; Co-requisites: None
   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. Students will (1) define and quantify objects' properties of motion, force, energy and momentum; (2) represent quantities of an object as vector and scalar measurements and manipulate them appropriately; (3) solve kinematic problems in two or more dimensions; (4) identify multiple forces acting on a system and calculate the resulting net acceleration; (5) understand and apply Newton's three Laws of Motion and Law of Gravity; (6) apply the concepts of work and energy to systems of motion, specifically energy conservation; (7) determine collisional interactions between systems in one and two dimensions, specifically utilizing the conservation of momentum; (8) translate between linear and rotational motion of rigid objects.
   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Kinematics (Constant Acceleration, 1-D and 2-D)
   2. Relative Velocity
   3. Projectile Motion
   4. Newton's Laws, Applications
   5. Friction (Static and Kinetic)
   6. Circular Motion
   7. Impulse & Linear Momentum
   8. Conservation of Momentum
   9. Work, Energy, and Power, including Gravitation and Elastic Potential Energy
   10. Conservation of Energy
   11. Simple Harmonic Motion

Prepared by: Dr. Sarvesh Kulkarni from Dr. Christopher Brown's syllabus of Spring 2019
Date: 05/21/2020

COURSE SYLLABUS

1. **PHY 2402 - Physics II: Electricity and Magnetism**

2. 3 credits, 3 contact hours (Mat/Sci Credits: 3)
   Three hour lecture per week

3. Course Coordinator: Dr. Dana Saxon

4. Text Book
   Randall D. Knight, *Physics for Scientists and Engineers: A Strategic Approach*, 4th ed., Vol. 2.
   a. Other Supplemental Materials: Course Notes

5. Specific Course Information
   a. Catalog Description
      Electrostatics, DC Circuits, magnetism, and AC circuits. Designed for students in the College of Engineering.

   b. Prerequisites: MAT 1505 (Concurrency allowed), PHY 2400 or PHY 2410; Co-requisites: None

   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. Demonstrate an understanding of the electric and magnetic vector fields, the electric potential, elements of electric circuits, and the unification of the electric and magnetic fields summarized in Maxwell's equations.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Electric Charge
   2. Electric Fields
   3. Gauss's Law
   4. Electric Potential
   5. Potential & Field
   6. Current & Resistance
   7. Magnetic Fields
   8. Induction
   9. EM Fields & Waves
   10. DC Circuits
   11. AC Circuits
   12. Modern Circuit Components

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Dana Saxon Date: 02/18/2020

COURSE SYLLABUS

1. **PHY 2403 - Physics Lab for Engineering**

2. 1 credit, 3 contact hours (Mat/Sci Credits: 1)
   Three hour laboratory per week

3. Course Coordinator: Dr. Christopher Brown

4. Text Book
   No required textbook. Materials are supplied online.
   a. Other Supplemental Materials: None

5. Specific Course Information
   a. Catalog Description
      Selected experiments illustrating the principles of Mechanics and Electricity and Magnetism. Designed for students in the College of Engineering.

   b. Prerequisites: PHY 2402 (May be taken concurrently); Co-requisites: None

   c. Required for B.S. Electrical Engineering

6. Course-specific Goals
   a. Through an interactive-discovery approach to experimental work in physics and engineering students will be able to reinforce the theoretical principles taught in the lecture courses.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X					X	

7. List of Covered Topics
   1. Kinematics in two dimensions
   2. Newton's 2nd law, Work and Energy
   3. Frictional laws and non-conservative forces
   4. Dynamics of circular motion and resistive force models
   5. Free fall and resistive force models
   6. Conservation of momentum
   7. Mechanical oscillations
   8. Electric potentials and fields
   9. Resistors and capacitors
   10. Motion of a charge in a magnetic field
   11. Electromagnetic induction

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Christopher Brown Date: 05/21/2020

COURSE SYLLABUS

1. **THL 1000 - Faith, Reason, and Culture**

2. 3 credits, 3 contact hours (General Education Credits: 3)
   Three hour lecture per week

3. Course Coordinator: Dr. Gregory Hoskins

4. Text Books
   Edward Foley, *From Age to Age: How Christians have Celebrated the Eucharist*, Liturgical Press, 2008.
   F. A. Murphy, K. Oakes, B. M. Mezei, *Illuminating Faith*, Bloomsbury T&T Clark, 2015.
   Warren Carter, *Seven Events that Shaped the New Testament World*, Baker Academic, 2013.
   David Rhoads, *Mark As Story*, National Book Network.
   a. Other Supplemental Materials: Course Notes

5. Specific Course Information
   a. Catalog Description
      Study of Christianity with a particular focus on Roman Catholicism, animated by Augustine's concern to relate Christian faith, reason and human culture, using various disciplinary approaches within the fields of theology and religious studies.
   b. Prerequisites: None; Co-requisites: None
   c. Required for B.S. Computer Engineering and B.S. Electrical Engineering

6. Course-specific Goals
   a. Articulate how faith shapes culture and how culture shapes religious/theological world-views and the expressions of faith; Explain religious/theological and cultural responses to select fundamental human questions; Read and interpret religious/theological texts, beliefs and practices using scholarly methods; Critically evaluate the significance of Christian beliefs, worship, and practices for personal, communal, societal and global living.

7. List of Covered Topics
   1. Carter's Seven Events
   2. Paper 1: Textual Exegesis
   3. Murphy's Illuminating Faith
   4. Paper 2: Principles of Justice
   5. Kelly's From Age to Age
   6. Paper 3
   7. Presentation: Architecture and Artwork

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Gregory Hoskins Date: 02/18/2020