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

1. **CSC 1300 - Discrete Structures**

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

3. Course Coordinator: Dr. Robert Beck

4. Text Book
   Gary Chartrand and Ping Zhang, *Discrete Mathematics*, Waveland Press, 2011.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Mathematical structures that support computer science: sets, matrices, trees, graphs, logic and proof, mathematical induction, relations, functions, sequences, summations, and elementary combinatorics.
   b. Prerequisites: None; Co-requisites: None
   c. Required for B.S. Computer Engineering

6. Course-specific Goals
   a. Establish an understanding of mathematical concepts that support computing, including sets, functions and relations, sequences, summations, Boolean logic, recurrences, elementary combinatorics, matrices, trees, and graphs; Establish an understanding of logic, proofs, and mathematical induction; Develop mathematical maturity, with emphasis on the ability to read and write valid mathematical arguments.

7. List of Covered Topics
   1. Sets - Notation, operations on sets, cartesian products, partitions
   2. Proofs - Quantifiers, types of proofs, mathematical induction, sequences and summations, recurrence relations
   3. Relations and Functions - Relations, relation representation, properties of relations, equivalence relations. Functions, one-to-one and onto functions, bijections, compositions of functions, inverse of functions
   4. Integers modular arithmetic - Integer representation, divisibility, modular arithmetic, congruences
   5. Counting - Sum & product principles; principle of inclusion-exclusion, Pigeonhole principle
   6. Combinatorics - Permutations & combinations; Binomial coefficients; Pascal's triangle
   7. Graphs - Graphs: vertices, edges, graph isomorphism, graph representation, subgraphs, paths, cycles, connected graphs, bipartite graphs
   8. Graph traversals - Eulerian circuits/-trails; Hamiltonian cycles
   9. Trees - properties of trees; rooted and spanning trees; decision trees; binary

trees, Minimum spanning trees; Prim's and Kruskal's algorithms
10. Graph Planarity - Planar graphs, Euler's identity, Kuratowski's theorem
11. Graph Colorability - chromatic number, 4-color theorem, graph coloring (greedy algorithm), applications

Prepared by: Dr. Daniel Joyce, CSC Department Date: 05/21/2020

COURSE SYLLABUS

1. **CSC 1600 - Operating Systems**

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

3. Course Coordinator: Kathleen Malone

4. Text Book
   Silberschatz, Galvin, Gagne, *Operating System Concepts Essentials*, 2nd ed.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      System software design and implementation; process and resource management; concurrency, scheduling, and deadlock; memory management; file systems and security.

   b. Prerequisites: CSC 2400 or ECE 2042; Co-requisites: None

   c. Required for B.S. Computer Engineering

6. Course-specific Goals
   a. Establish an understanding of the role of the operating system; Establish an understanding of system programming; Establish an understanding of process management; Establish an understanding of memory management; Establish an understanding of file systems; Establish an understanding of security and protection.

7. List of Covered Topics
   1. Role of the operating system
   2. Process and resource management
   3. Threads, concurrency and deadlock
   4. CPU scheduling
   5. Memory management
   6. File systems
   7. Security and protection

Prepared by: Dr. Daniel Joyce, CSC Department Date: 05/21/2020

COURSE SYLLABUS

1. **CSC 2014 - Java Bootcamp**

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

3. Course Coordinator: Dr. Daniel Joyce

4. Text Book
   Lewis and Loftus, *Java Software Solutions*, 9th ed., Addison Wesley.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Fast-paced coverage of object-oriented programming using Java and the Java API, including packages for creating graphics and applets; Java syntax and control structures; arrays; designing objects, classes, and methods; graphical user interfaces; input streams, exception handling and threads.

   b. Prerequisites: CSC 1010 or ECE 1620 or MIS 2020; Co-requisites: None

   c. Required for B.S. Computer Engineering

6. Course-specific Goals
   a. N/A

7. List of Covered Topics
   1. Data and Expressions
   2. Data Conversion, Input, Decision
   3. Repetition and Reading from a File
   4. Kattis
   5. Using Classes
   6. Clean Up
   7. Creating Classes
   8. Arrays
   9. Efficiency
   10. Practice
   11. Object Orientation

Prepared by: Dr. Daniel Joyce, CSC Department Date: 05/21/2020

COURSE SYLLABUS

1. **CSC 3150 - Game Development**

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

3. Course Coordinator: Dr. Edward Kim

4. Text Book
   T, Fullerton, *Game Design Workshop, A Playcentric Approach to Creating Innovative Games, 4 ed.*, ISBN-13: 978-1138098770.
   a. Other Supplemental Materials: None

5. Specific Course Information
   a. Catalog Description
      Theory of game development, game programming, artificial intelligence, state machines, 2D/3D assets, visual communication, game mechanics, navigation meshes, path planning.

   b. Prerequisites: CSC 1052 or ECE 2620; Co-requisites: None

   c. Selected Elective for B.S. Computer Engineering

6. Course-specific Goals
   a. Students will: Understand the fundamental principles of game design and development; analyze and critique games in terms of mechanics and content; articulate and advocate for their ideas through presentations and discussions; create a variety of games both digital and non-digital; become familiar with typical tools and applications used in game design and development; and establish an understanding of basic algorithms and structures of game AI including trees, graphs, queues, min-max, and path-finding.

7. List of Covered Topics
   1. Game physics
   2. Game engine programming
   3. Agent artificial intelligence
   4. State machines
   5. 2D/3D assets
   6. Visual communication
   7. Game mechanics
   8. Navigation meshes
   9. Path planning

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Edward Kim Date: 06/07/2020

COURSE SYLLABUS

1. **CSC 4181 - Compiler Construction**

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

3. Course Coordinator: Dr. Thomas Way

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

5. Specific Course Information
   a. Catalog Description
      Lexical and syntactical analysis; code generation; error recovery; recursive descent compilation; handling of run-time environment.

   b. Prerequisites: CSC 1600, CSC 2400; Co-requisites: None

   c. Required for B.S. Computer Engineering

6. Course-specific Goals
   a. Establish an understanding of the concepts and tools used for the development of compilers and other language translation software; Provide experience in the development of a complete, working compiler for a substantial language; Explore the connections between compilers and formal languages, data structures, and computer architecture; Gain an understanding of the principles of software engineering and software development.

7. List of Covered Topics
   1. Introduction
   2. Lexical analysis
   3. Grammars, Top-down parsing methods
   4. Bottom-up parsing techniques
   5. Automatic compiler generation tools
   6. Symbol tables
   7. Semantic Analysis, Attribute grammars, Syntax-directed translation, Intermediate code generation
   8. Code generation: expressions and simple control structures
   9. Code generation: records and arrays
   10. Code generation: procedures and functions
   11. Runtime memory management

Prepared by: Dr. Daniel Joyce, CSC Department Date: 05/21/2020

COURSE SYLLABUS

1. **CSC 4300 - Computer Graphics**

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

3. Course Coordinator: Dr. Mirela Damian

4. Text Book
   None
   a. Other Supplemental Materials: Class Notes and Online Resources

5. Specific Course Information
   a. Catalog Description
      Hardware and software in computer graphics; graphics programming language; input/output device handling; modeling in 3D space; development of interactive software.
   b. Prerequisites: CSC 2053; Co-requisites: None
   c. Selected Elective for B.S. Computer Engineering

6. Course-specific Goals
   a. Students will: Understand the design issues for creating graphics; understand the mathematical foundations of graphics; understand the stages in the graphics pipeline; acquire basic skills on Blender modeling and OpenGL programming; experiment with virtual reality simulation software.

7. List of Covered Topics
   1. Computer graphics pipeline, Blender
   2. OpenGL, GLSL
   3. Vertex and fragment shaders
   4. Texture mapping
   5. Transformations and animation
   6. Camera positioning, projection
   7. Lighting, shading
   8. Keyframe interpolation
   9. Blender models in Vizard

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Mirela Damian Date: 06/07/2020

COURSE SYLLABUS

1. **CSC 4380 - Information Visualization**

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

3. Course Coordinator: Dr. Edward Kim

4. Text Book
   E. R. Tufte, *Envisioning Information*, ISBN-13: 978-0961392116, ISBN-10: 0961392118.
   S. Murray, *Interactive Data Visualization*, ISBN-13: N/A, ISBN-10: 1449339735

   a. Other Supplemental Materials: (Recommended)
   R. Spence, *Information Visualization, 3 ed.*, ISBN-13: 978-3-319-07340-8.
   T. Munzner, *Visualization Analysis and Design*, ISBN-13: 978-1466508910.

5. Specific Course Information
   a. Catalog Description
      The presentation of information; visual cognition, scientific visualization, illustration presentation, color theory, motion dynamics, image processing.
   b. Prerequisites: CSC 1052 or equivalent; Co-requisites: None
   c. Selected Elective for B.S. Computer Engineering

6. Course-specific Goals
   a. Students will: Establish an understanding of the issues underlying the visualization of information, including color theory, motion dynamics, and visual cognition; provide the experience of developing and presenting a project that focuses on envisioning information; and explore software tools that facilitate the visualization of information.

7. List of Covered Topics
   1. Layering, separation, HTML5, XML, SVG
   2. Color, representations, SVG/javascript
   3. Representations, Interaction, D3
   4. Text, documents, maps
   5. Social visualization
   6. Networks, clustering
   7. Databases and data analysis

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Edward Kim Date: 06/07/2020

COURSE SYLLABUS

1. **CSC 4450 - Special Topics: Digital Forensics**

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

3. Course Coordinator: Mr. D. Justin Price

4. Text Book
   Nelson, Phillips and Steuart, *Guide to Computer Forensics and Investigations , 5 Ed.*, ISBN-10: 1285060032, ISBN-13: 978-1285060033.
   a. Other Supplemental Materials: Class Notes

5. Specific Course Information
   a. Catalog Description
      In-depth study of digital evidence presentation, digital forensic techniques, and data analysis. Password cracking, encryption/decryption, volatile data extraction and network forensics of advanced forensic tools, legal and ethical issues related to forensics and security management techniques required for resiliency in today's digital workplace.
   b. Prerequisites: CSC 1052 or equivalent; Co-requisites: None
   c. Selected Elective for B.S. Computer Engineering

6. Course-specific Goals
   a. Students will: Understand the role and importance of digital forensics; understand the practice of write-protection and data acquisition; understand the importance of file system analysis in data recovery; demonstrate the theoretical and practical perspectives of digital forensics; demonstrate proficiency in the analysis of evidentiary trails and artifacts of data storage devices; appreciate the role that ethics must play in forensic analysis; understand the legal foundations for crimes, evidence, forensics, and discovery; and estimate future trends in digital forensics

7. List of Covered Topics
   1. Digital evidence preservation
   2. Digital forensic techniques and data analysis
   3. Password cracking
   4. Encryption/decryption
   5. Volatile data extraction
   6. Network forensics
   7. Advanced forensic tools
   8. Legal and ethical issues
   9. Security management techniques

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Mr. D. J. Price Date: 06/07/2020

COURSE SYLLABUS

1. **CSC 4480 - Principles of Database Systems**

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

3. Course Coordinator: Ms. Kristin Obermyer

4. Text Book
   R. Elmasri and S. Navathe, *Fundamentals of Database Systems, 7 Ed.*, Pearson, 2016.
   a. Other Supplemental Materials: None

5. Specific Course Information
   a. Catalog Description
      Concepts and technology of database management systems and data modeling with an emphasis on the relational model; database querying and normalization; physical data organization.

   b. Prerequisites: (CSC 1051 or ECE 1620) and (CSC 1300 or MAT 2600); Co-requisites: None

   c. Selected Elective for B.S. Computer Engineering

6. Course-specific Goals
   a. Establish an understanding of: database principles and the technologies underlying database management systems; and of data models (with an emphasis on the relational model), physical data organization, data design, normalization, and querying.

7. List of Covered Topics
   1. Relational database model
   2. Relational algebra
   3. Entity Relationship (ER) model, ER conversion to schema
   4. Normalization
   5. Database programming, SQL
   6. Non-Relational Database (NoSQL)
   7. Storage: indexing, hashing, and physical design
   8. Transaction management, concurrency control
   9. Database security

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Ms. Kristin Obermyer Date: 06/07/2020

COURSE SYLLABUS

1. **CSC 4500 - Artificial Intelligence**

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

3. Course Coordinator: Mr. Gregory Safko

4. Text Book
   S. Russell and P. Norvig, *Artificial Intelligence: A Modern Approach, 3 ed.*, Prentice Hall, ISBN: 978-0136042594.
   a. Other Supplemental Materials: (Optional)
   W. F. Clocksin and C.S. Mellish, *Programming in Prolog, 4 Ed. or 5 Ed.*, Springer, ISBN (4 ed.): 3-540-58350-5, ISBN (5 ed.): 3-540-00678-8.

5. Specific Course Information
   a. Catalog Description
      The nature of intelligence and the question of its computer implementation; search algorithms; knowledge representation; automated deduction; natural language understanding; planning; problem solving.
   b. Prerequisites: CSC 1052 or ECE 2620; Co-requisites: None
   c. Selected Elective for B.S. Computer Engineering

6. Course-specific Goals
   a. Establish an understanding of: (1) the history of Artificial Intelligence (AI), and its application in computerized implementations, and (2) agents, environments and constraints.
      To examine: (1) appropriate computer programming languages used in the field of AI, and (2) the topics of searching, constraints, inference, planning, and knowledge representation in the realm of AI.
      To explore relative contemporary topics in AI, including robotics and machine learning.

7. List of Covered Topics
   1. Introductory concepts in AI
   2. Agents, environments, constraints
   3. Prolog, other AI languages
   4. Searching, inference, and planning
   5. Knowledge representation
   6. Contemporary AI topics: robotics, machine learning

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Mr. Gregory Safko Date: 06/07/2020

COURSE SYLLABUS

1. **CSC 4510 - Machine Learning**

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

3. Course Coordinator: Dr. Ben Mitchell

4. Text Book
   M. Kubat, *An Introduction to Machine Learning, 2 ed.*, Springer, 2017, ISBN-13: 978-3319639123.
   a. Other Supplemental Materials: On reserve at library.

5. Specific Course Information
   a. Catalog Description
      The design of software systems that adapt to new circumstances and detect and extrapolate patterns; neural networks; decision tree induction; genetic algorithms and genetic programming.
   b. Prerequisites: CSC 1051 or ECE 1620 or equivalent; Co-requisites: None
   c. Selected Elective for B.S. Computer Engineering

6. Course-specific Goals
   a. Students will become familiar with the basics of machine learning, including the ability to apply a variety of learning algorithms, as well as understanding the strengths and weaknesses of each.

7. List of Covered Topics
   1. Parametric and non-parametric modeling
   2. Clustering
   3. Decision tree induction
   4. Support vector machines
   5. Neural networks
   6. Reinforcement learning
   7. Classification and function approximation
   8. Supervised and unsupervised learning
   9. Application to real-world problems
   10. Empirical performance of ML algorithms
   11. Practical and ethical issues

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Ben Mitchell Date: 06/08/2020

COURSE SYLLABUS

1. **CSC 4630 - Software Development and Systems**

2. 3 credits, 3 contact hours (Engineering Topic Credits: 3)
   Three hour lecture and hands-on practicums per week

3. Course Coordinator: Dr. Don Goelman

4. Text Books:
   1. Kernighan and Pike,*The UNIX Programming Environment*, Prentice-Hall, ISBN-13: 978-0139376818.
   2. Kernighan and Ritchie, *The C Programming Language*, Prentice-Hall, ISBN-13: 978-0131103627.
   a. Other Supplemental Materials: Class slides, notes and other Internet resources

5. Specific Course Information
   a. Catalog Description
      Operating system structures; system calls; system libraries; inter process communication; user-interface programming environments; software utilities; software portability.
   b. Prerequisites: CSC 1600 or CSC 2405 and CSC 2053; Co-requisites: None
   c. Selected Elective for B.S. Computer Engineering

6. Course-specific Goals
   a. (1) To establish an understanding of software design and development through the use of software tools and program interoperability.
      (2) To explore various system-oriented software tools, including command interpreters, system libraries, pattern matchers, and filters.

7. List of Covered Topics
   1. UNIX Operating System: shell programming (Cshell & Bourne shell)
   2. File system
   3. Regular expressions
   4. Unix filters (awk, grep, sed...)
   5. Unix user commands and utilities
   6. C programming (review): flow control, arrays, pointers, structures and unions
   7. C standard library functions, system calls, socket programming
   8. Introduction to some programming tools such as make, prof, gprof and sccs

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Mr. Najib Nadi Date: 06/12/2020

COURSE SYLLABUS

1. **CSC 4700 - Software Engineering**

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

3. Course Coordinator: Ms. Kristin Obermyer

4. Text Book (E-book, free from Falvey library)
   R. Stephens, *Beginning Software Engineering*, Wiley, 2015.
   a. Other Supplemental Materials: Selected online articles.

5. Specific Course Information
   a. Catalog Description
      Management and production of software systems; the software life cycle; software design techniques and methodologies; participation in a team software development project.

   b. Prerequisites: CSC 1052 or ECE 2620; Co-requisites: None

   c. Selected Elective for B.S. Computer Engineering

6. Course-specific Goals
   a. Survey the discipline of software engineering, including development processes, life-cycle models, quality issues, requirements analysis, design techniques, testing, and project management. Study and practice oral and written communication skills with respect to software development projects. Explore modern software development tools. Gain a strong enough foundation in software engineering that it could lead to a career.

7. List of Covered Topics
   1. Software engineering methods and practices
   2. Waterfall and evolutionary models
   3. Project management: planning, scheduling, risk management
   4. Software requirements, SRS document
   5. Software architectural styles
   6. Modularity and coding standards
   7. Verification, validation (incl. static analysis), and reviews
   8. Unit and integration testing
   9. Version management
   10. Software quality control
   11. Ethical and professional issues
   12. Teamwork and project-based experience

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Ms. Kristin Obermyer Date: 06/07/2020

COURSE SYLLABUS

1. **CSC 4730 - Human Computer Interaction**

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

3. Course Coordinator: Ms. Sandra Kearney

4. Text Book
   B. Shneiderman et al., *Designing the User Interface, 6 Ed.*, Pearson, 2017.
   a. Other Supplemental Materials: ACM journal articles, conference proceedings and "ACM Interactions".

5. Specific Course Information
   a. Catalog Description
      Design of the user/system interface; measurement of human-computer interaction; models of the user and user communities; design criteria for the interface; user interface management systems (UIMS); test and evaluation strategies and tools.

   b. Prerequisites: CSC 1052; Co-requisites: None

   c. Selected Elective for B.S. Computer Engineering

6. Course-specific Goals
   a. Students will: (1) understand user experience and the integral aspects of interaction and interface; (2) understand interface and interaction with new devices and environments; (3) explore expectations and agendas for experience, interaction and interface; (4) develop design principles for components of the user interface; (5) conduct an experiment to compare implementations of these principles in a particular setting; (6) examine journal articles dealing with diverse aspects of human computer interaction; (7) implement pieces of a system interface; and (8) construct formal methods to specify and model user experience with emphasis on interaction and interface.

7. List of Covered Topics
   1. UI design concepts and design criteria
   2. HCI measurement
   3. Formal methods
   4. User and community models
   5. User Interface Management Sys (UIMS)
   6. Testing and evaluation
   7. Associated tools

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Ms. Sandra Kearney Date: 06/07/2020

COURSE SYLLABUS

1. **CSC 4800 - Web Application Development**

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

3. Course Coordinator: Mr. Gregory Safko

4. Text Book
   Tatroe, MacIntyre and Lerdorf, *Programming with PHP, 3 Ed.*, O'Reilly, ISBN: 978-1-449-38277-2.
   a. Other Supplemental Materials: None

5. Specific Course Information
   a. Catalog Description
      Theory and design of web-based applications: stylesheets, applets, HTML, CGI programming, web server design, website design, security, multimedia representations, encryption, compression.

   b. Prerequisites: CSC 2053; Co-requisites: None

   c. Selected Elective for B.S. Computer Engineering

6. Course-specific Goals
   a. Students will: (1) establish an understanding of web-based software architectures; (2) explore a broad spectrum of web technology standards, including XML, XHTML, CSS, and at least one server-side processing technology suite; and (3) explore issues related to web site design, navigation, accessibility, and content.

7. List of Covered Topics
   1. Web based software architectures
   2. XML
   3. XHTML
   4. CSS
   5. Server-side processing
   6. Principles of good website design
   7. Site navigation
   8. Accessibility
   9. Content selection and presentation

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Mr. Gregory Safko Date: 06/08/2020

COURSE SYLLABUS

1. **CSC 4810 - Mobile App Development**

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

3. Course Coordinator: Dr. Frank Klassner

4. Text Book
   None
   a. Other Supplemental Materials: Class Notes and programming handbooks

5. Specific Course Information
   a. Catalog Description
      Theory and practice of designing apps for mobile devices; interface design, platform-specific and platform-independent programming, sensor-based computing, cloud data management, security, and privacy; entrepreneurial practices for app development: ideation, business planning, and commercialization.

   b. Prerequisites: CSC 1051 or equivalent; Co-requisites: None

   c. Selected Elective for B.S. Computer Engineering

6. Course-specific Goals
   a. Students will: (1) learn to work in teams to develop a viable mobile app; (2) learn to develop business plans, marketing strategies and explore funding avenues for their mobile app; (3) understand the complementary aspects of technology and business.

7. List of Covered Topics
   1. iOS, Android platforms and web-based development tools
   2. Objective C or Java programming
   3. HTML, Javascript & CSS3
   4. App development process
   5. UI development
   6. Sensors, external hardware
   7. Location-based and context-aware services
   8. Wireless communication
   9. Security issues
   10. Market strategy, business plan
   11. Legal, strategic, startup issues

Prepared by: Dr. Sarvesh Kulkarni from the syllabus of Dr. Frank Klassner Date: 06/07/2020

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 2044 - Fundamentals of CPE II**

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

3. Course Coordinator: Prof. Edward Char

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

5. Specific Course Information
   a. Catalog Description
      Continuation of ECE 2041. Topics include the PIC Microprocessor, VHDL, QuineMcCuskey method, fault detection and localization, state machine minimization, state machine testing, and codes.

   b. Prerequisites: ECE 2042, ECE 2043; Co-requisites: ECE 2045

   c. Required for B.S. Computer Engineering

6. Course-specific Goals
   a. Learn the instruction set and basic architecture of PIC 16F877 microcontroller, and learn to write programs containing subroutines, interrupts and other constructs in assembly language. Learn a simple form of pseudocode. Learn the Particle IO Photon ARM microprocessor and write programs on it using C. Learn to minimize Boolean functions using the tabular method of Quine-McCluskey. Learn to identify and eliminate static hazards. Learn methods to determine if a circuit is faulty, and how to localize such faults. Learn several coding schemes including weighted, cyclic, error correcting, and Huffman codes. Learn techniques for analog-to-digital and digital-to-analog conversions.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. PIC 16F877Microcontroller
   2. Quine-McCluskey
   3. Fault Detection
   4. A/D and D/A conversions
   5. Particle IO Photon
   6. Static Hazards
   7. Codes

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

COURSE SYLLABUS

1. **ECE 2045 - Fundamentals of Computer Engineering II Lab**

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

3. Course Coordinator: Dr. X. Maggie Wang

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

5. Specific Course Information
   a. Catalog Description
      This laboratory course in intended to be taken concurrently with ECE 2044. Includes exercises on the PIC and the uses of VHDL.

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

   c. Required for B.S. Computer Engineering

6. Course-specific Goals
   a. After successful completion of the course, the student will understand from the engineer's perspective how a computer hardware system works, and will be able to design and implement pipelined processors and their basic peripherals from basic logic gates on an FPGA board. Students will also be able to analyze and evaluate how various architectural factors affect computer system performance.

   b.

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

7. List of Covered Topics
   1. PIC Microcontroller
   2. ARM Processor (Photon) C Programming

Prepared by: Dr. X. Maggie Wang 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 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

1. **ECE 2620 - C++, Algorithms, & Data Structures**

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

3. Course Coordinator: Dr. Sarvesh Kulkarni

4. Text Book
   Online, interactive instructor-customized textbook from zyBooks.
   a. Other Supplemental Materials: Instructor's notes posted on Blackboard LMS

5. Specific Course Information
   a. Catalog Description
      C++ classes, access rules, inheritance, friends, abstract classes, passing parameters by value, by reference, polymorphism in functions and operators, static and dynamic binding, templates; searching, sorting; pointer implementation of lists, stacks, queues, trees, hashing; P and NP classes; analysis of algorithms.
   b. Prerequisites: ECE 1620; Co-requisites: None
   c. Required for B.S. Computer Engineering

6. Course-specific Goals
   a. Proficiency in C++ using object oriented techniques; the selection and use of appropriate data structures, and the use of running-time analysis of algorithms to write efficient programs
   b.

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

7. List of Covered Topics
   1. Introduction to C++
      a. Abstract data types
      b. Classes, objects, members
      c. Templates
      d. Inheritance, Polymorphism
      e. Pointer and Dynamic Variables
   2. Computational Efficiency
      a. P, NP and Undecidable Problems
      b. Algorithm Complexity (Running Time)
   3. Lists, Stacks, Queues, and Binary Trees
      a. Implementation Using Arrays and Pointers
      b. Operations (Insertion, Deletion)
   4. Sorting Algorithms
      a. Bubble sort
      b. Mergesort
   5. Hashing (if time permits)
      a. Hash Functions
      b. Implementation (with Collision Resolution)

Prepared by: Dr. Sarvesh Kulkarni Date: 10/09/2019

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 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

COURSE SYLLABUS

1. **ECE 3245 - Discrete Time Signals and Systems**

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

3. Course Coordinator: Dr. Mojtaba Vaezi

4. Text Book
   A. Oppenheim and A. Willsky, *Signals and Systems, 2nd ed.*, NJ, 1997.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Discrete-time signal and system representation; sampling of continuous signals; discrete-time Fourier and Z-transformations; frequency content of signals and frequency response of systems; systems analysis and filtering.

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

   c. Required for B.S. Computer Engineering

6. Course-specific Goals
   a. The student will be able to:
      (1) classify different types of signals and systems,
      (2) demonstrate an understanding of the properties of continuous time linear time-invariant (LTI) systems,
      (3) determine the response of an LTI system to an arbitrary input in both time and frequency domain,
      (4) apply Fourier series and transforms for signal and system analysis,
      (5) describe properties of discrete-time LTI systems,
      (6) define discrete-time signals and systems,
      (7) determine the response of a discrete-time LTI system to an arbitrary input in both time and frequency domain, and
      (8) obtain the z-transform of a discrete-time signal.

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics

    1. Discrete-time signal operations
    2. Continuous-time signal operations
    3. Discrete-time system characteristics
    4. Continuous-time system characteristics
    5. Convolutions, Impulse Responses, Frequency Responses
    6. Difference Equations; Differential Equations; System Block Diagrams
    7. Discrete-time and Continuous-time Fourier transforms
    8. Discrete-time and Continuous-time Fourier Series
    9. Z-transform

Prepared by: Dr. Moeness Amin Date: 06/08/2020

COURSE SYLLABUS

1. **ECE 3445 - Computer Architecture**

2. 4 credits, 5 contact hours (Engineering Topic Credits: 4)
   Three hour lecture, Two Hour hands-on supervised practicum per week

3. Course Coordinator: Dr. X. Maggie Wang

4. Text Book
   David A. Patterson and John L. Hennessy, *Computer Organization and Design: The Hardware/Software Interface*, 5th ed., Morgan Kaufmann, ISBN: 9780124077263.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      Fundamentals of instruction sets and their efficient execution - e.g., pipelines, caches, out-of-order execution, and branch prediction mechanisms. Performance analysis, superscalar, VLIW, multithreading, and multiprocessing are among the topics studied. Trace-driven simulators are used in practicums to explore concepts learned in class.

   b. Prerequisites: ECE 2044, ECE 2045; Co-requisites: None

   c. Required for B.S. Computer Engineering

6. Course-specific Goals
   a. Understand from the engineering's perspective how a computer hardware system works; Be able to design and implement pipelined processors and their basic peripherals from basic logic gates on an FPGA board; Understand and evaluate various factors that affect computer system performance

   b.

Student Outcomes						
1	2	3	4	5	6	7
X					X	

7. List of Covered Topics
   1. Computer Technology Evolution
   2. Instruction Set Architecture Overview
   3. MIPS Processor Instruction Set
   4. Signed and Unsigned Addition/Subtraction & ALU Design
   5. Sequential and Parallel Multipliers
   6. Binary Division
   7. Floating-point Arithmetic Operations
   8. Understanding Computer Performance
   9. Single-cycle MIPS Processor: Datapath and Control
   10. Multi-cycle MIPS Processor: Datapath and Control
   11. Ideal Pipelined MIPS processor datapath and control
   12. Pipelining: Data Hazards and Branch Hazards
   13. Memory Introduction and Memory Tech-

nologies
14. Cache
15. Visual Memory
16. Parallel Processors

Prepared by: Dr. X. Maggie Wang 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 3476 - Computer and Network Security**

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

3. Course Coordinator: Dr. Danai Chasaki

4. Text Books
   William Stallings, *Cryptography and Network Security: Principles and Practice (7th edition)*, Prentice Hall, 2016.
   a. Other Supplemental Materials: None

5. Specific Course Information
   a. Catalog Description
      Computer security in the context of the Internet, including hands-on exercises and experiments in the areas of authentication, attacks and threats, email and communication digital signatures and encryption, mobile devices, privacy, safe browsing and certificates.

   b. Prerequisites: ECE 4470 or CSC 2405; Co-requisites: see pre-requisites (concurrency allowed)

   c. Required for B.S. Computer Engineering

6. Course-specific Goals
   a. Students will understand computer security in the context of the Internet, including hands-on exercises and experiments in the areas of authentication, attacks and threats, email and communication, digital signatures and encryption, mobile devices, privacy, safe browsing and certificates.

   b.

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

7. List of Covered Topics
   1. Network/operating system/web security introduction and current trends
   2. Wireless security, wireless attacks
   3. Operating system security
   4. Malware
   5. Buffer overflows
   6. Passwords/combinations/permutations/entropy
   7. Authentication
   8. Introduction to cryptography
   9. Hash functions
   10. Public key cryptography
   11. Network protocols
   12. Physical attacks

Prepared by: Dr. Danai Chasaki Date: 05/15/2020

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

1. **ECE 3971 - Design Seminar - CpE**

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. Computer 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

1. **ECE 4470 - Computer Networks**

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

3. Course Coordinator: Dr. Sarvesh Kulkarni

4. Text Books
   L. L. Peterson and B. S. Davie, *Computer Networks - A Systems Approach, 5th ed.*, Morgan Kaufmann, 2012. ISBN: 978-0-12-385059-1.
   a. Other Supplemental Materials: Class slides and notes

5. Specific Course Information
   a. Catalog Description
      ISO/OSI, TCP/IP reference models; data transmission, encoding, framing, error detection, stop-and-wait, sliding windows; CSMA/CD, Ethernet; bridges, spanning tree protocol; connectionless, connection-oriented and source routing, IP addressing, forwarding, VPNs; switching fabrics; ARP, DHCP, DV, OSPF, BGP, DNS.

   b. Prerequisites: ECE 1620; Co-requisites: None

   c. Required for B.S. Computer Engineering

6. Course-specific Goals
   a. At the conclusion of this course, students are expected to: Acquire a broad understanding of the principles of architectural design and operation of contemporary wired networks; Be acquainted with the hardware, software and design tradeoffs in current networks; Understand how network protocols at different levels inter-operate with each other; Learn the use of common network analysis tools; Implement a simple but fully working protocol on Ubuntu Linux in C (or C++) using the gcc (or g++) open source compiler.

   b.

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

7. List of Covered Topics
   1. The ISO-OSI and the TCP/IP reference models for communication, functions of individual layers, data movement between layers, protocols and their relationship to layers.
   2. PHY data transmission: wired media and wireless media; basics of modulation; NRZ, NRZI, Manchester and 4B/5B encoding; the Nyquist and Shannon-Hartley theorems (without proof) and their application.
   3. Data link layer: framing; error detection

using 2-D parity, checksum and Cyclic Redundancy Check (CRC); error recovery - stop-and-wait & sliding window protocol; CSMA/CD and case study of Ethernet; Learning bridges and Spanning Tree Protocol (STP).

4. Network layer: virtual circuits, datagrams, source routing; intra-domain routing algorithms - Distance Vector (DV), Open Shortest Path First (OSPF); inter-domain routing Border Gateway Protocol (BGP); IP addressing with classes, Classless Inter-Domain Routing (CIDR); IP subnets, masks, route lookups; switching fabrics and network processors
5. Protocols - ARP, DHCP; Private communication - Virtual Private Networks (VPNs).
6. Name resolution - Domain Name Service (DNS) architecture, records, and usage.
7. Laboratory topic 1: Design/implement simple file transfer protocol over UDP by programming in C or C++ using gcc/g++ compiler on Ubuntu Linux.
8. Laboratory topic 2: Network analysis tools - ping, route, traceroute, ss and wireshark

Prepared by: Dr. Sarvesh Kulkarni Date: 01/26/2020

COURSE SYLLABUS

1. **ECE 4971 - Design Project - CpE**

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 CpE Standing; Co-requisites: None

   c. Required for B.S. Computer Engineering

6. Course-specific Goals
   a. To allow completion of the Senior Design Project technical work that was planned and initiated in ECE 3971

   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 4973 - Design Project Report - CpE**

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 4971.
   b. Prerequisites: ECE 4971; Co-requisites: None
   c. Required for B.S. Computer 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 5400 - Applied Machine Learning**

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
   C. M. Bishop, *Pattern Recognition and Machine Learning*, 1st ed., Springer, 2006.
   a. Other Supplemental Materials: Class notes

5. Specific Course Information
   a. Catalog Description
      In this course, we will study how to enable efficient processing of machine learning methods. First, we will study the basic knowledge of various machine learning models, such as logistic regression, support vector machine, and neural networks. Second, we will study software techniques such as compression and pruning to enable efficient processing of neural networks. Third, we will study hardware techniques to such as in-memory processing to accelerate training and inference process. Last, we will study how we can combine software and hardware techniques to maximize the benefits.

   b. Prerequisites: None; Co-requisites: None

   c. Selected Elective for B.S. Computer Engineering

6. Course-specific Goals
   a. Thoroughly examine the emerging trends in industry to understand the underlying research challenges and opportunities; Implement the machine learning methods and apply on real-world datasets; Optimize the existing neural networks model using covered techniques and evaluate its effectiveness

   b.

Student Outcomes						
1	2	3	4	5	6	7
X						

7. List of Covered Topics
   1. Introduction to Machine Learning
      a. Logistic Regression
      b. Support Vector Machine
      c. Decision Tree
      d. Applications on Real-World Datasets
   2. Neural Networks
      a. Multilayer Perceptron
      b. Convolutional Neural Networks
      c. Recurrent Neural Networks
   3. Algorithmic Optimization of Neural Networks
      a. Pruning
      b. Compression

c. Quantization

4. Hardware Optimization of Neural Networks
   a. Inexect Hardware
   b. In-Memory Computing

Prepared by: Dr. Xun Jiao

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

COURSE SYLLABUS

1. **ECE 5478 - Engineering Secure Cyber-Physical Systems**

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

3. Course Coordinator: Dr. James Solderitsch

4. Text Book
   N/A
   a. Other Supplemental Materials: Cybati Vimeo Course

5. Specific Course Information
   a. Catalog Description
      Cyber-Physical Systems include home automation and protection, connected vehicles, connected medical devices, drones, smart buildings and cities, and industrial control systems. Secure engineering of cyber-physical systems leading to a safer and more secure connected environment that also respects personal privacy. Improvement of security after deployment. Emphasis on hands-on activities and lab work.

   b. Prerequisites: None; Co-requisites: None

   c. Selected Elective for B.S. Computer Engineering

6. Course-specific Goals
   a. Define CI sectors and identify legislation and standards addressing CI protection

   b. Define common terms and concepts associated with CI, including ICS, SCADA, PCS, and DCS

   c. Identify the components and process of implementing a CISR (Critical Infrastructure Security and Resilience) risk management program

   d. Describe cybersecurity services such as confidentiality, integrity, availability, and authentication as they apply to critical infrastructure systems

   e. Select appropriate vulnerability assessment frameworks and tools as a part of a risk assessment of a CI system; Identify and describe cybersecurity threats, risks, vulnerabilities, and attacks as they apply to CI systems; Identify an appropriate risk management strategy for CISR

   f.

Student Outcomes						
1	2	3	4	5	6	7
			X			X

7. List of Covered Topics

1. Introduction to ICS and Security
    a. Raspberry PI Hands-on, at-home lab environment, Cybati VM
    b. Control System Cyber Architecture Components
    c. Sensors and Actuators
    d. PLCs, PLC Programming including Ladder Logic, PLC Points and Tags
2. Industrial Network Design and Assessment
    a. Terminology
    b. Case Studies and Intelligence gathering including OSINT
    c. Vulnerability Assessments and Pen-Testing Concepts
    d. Security Assessments
3. Responsible ICS Security Principles and Resources
    a. CERT and ICS-CERT notifications
    b. Hardware hacking of Control Systems
    c. DCS, SCADA, OPC, HMI and device protection and controls
    d. More ICS models and environments
4. Industrial Control System Communications
    a. ICS Wireless protocols
    b. ICS Wired protocols
    c. Communication exploit analysis and construction (Metasploit)
    d. Network infrastructure protection and controls
    e. Secure remote access solutions
5. ICS Security Layers and Situational Awareness
    a. Integrating and monitoring layered operational, cyber and physical controls
    b. Situational awareness, assessment and incident response
    c. Intrusion detection and prevention
    d. Forensics and attribution in control systems

Prepared by: Dr. James Solderitsch 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 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 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. **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