COURSE CONTENTS

COMPUTER SCIENCE AND ENGINEERING

MATH 103 Calculus I - Differential (3+2) 4 – ECTS = 5
Differential calculus including analytic geometry; functions, limits and continuity; derivatives, techniques and applications of differentiation; logarithmic and trigonometric functions.
Textbook: Thomas' Calculus, Maurice D. Weir, Joel Hass, and Frank R. Giordano, Pearson.

MATH 104 Calculus II – Integral (3+2) 4 – ECTS = 6
Integral calculus including definite and indefinite integrals; techniques of integration; applications in mathematics and engineering; infinite series. (Prerequisite: MATH 201 or consent of instructor).
Textbook: Thomas' Calculus, Maurice D. Weir, Joel Hass, and Frank R. Giordano, Pearson.

PHYS 103 Physics I - Mechanics and Dynamics (3+2) 4 – ECTS = 4
Introduction to classical mechanics for students in engineering and the physical sciences. Measurement, units, and foundations of physics; vectors; kinematics; circular motion; forces, mass, and Newton's laws; center of mass; momentum; work and energy; conservation laws; collisions; rotational kinematics.
Textbook: Physics for Scientists and Engineers, Fishbane et. al., 2005. Addison-Wesley.

PHYS 103L Physics I – Lab: Mechanics and Dynamics (0+2) 1 – ECTS = 1
Lab work on foundations of physics; vectors; kinematics; circular motion; forces, mass, and Newton's laws; center of mass; momentum; work and energy; conservation laws; collisions; rotational kinematics.

ENGR 100 Computer Skills (0+2) 1 – ECTS = 2

Course objectives: The course aims at equipping the students with basic computer skills needed for effective engineering.

Learning outcomes: Effectively use basic and most common office tools. Prepare well formatted text documents with tables and graphs. Use EXCEL for data entry, spread sheet computations and drawing charts. Learn how to use MATLAB software for basic engineering applications and problem solving. Prepare a presentation file with good formatting and text effects.

Textbook: 1. Exploring: Microsoft Office 2013, Volume 1, Marry Anne Poatsy, Pearson.

2. Introduction to MATLAB, Delores M. Etter, 2nd edition, Pearson

PHYS 104 Physics II - Electromagnetics and Moderns Physics (3+2) 4 – ECTS = 6

Rotational dynamics and angular momentum; equilibrium and elasticity; periodic motion including LRC electrical circuits; gravitation; fluid mechanics; temperature; thermal expansion; heat and the first law of thermodynamics; heat conduction; kinetic theory of gases; entropy and the second law; heat engines. (Prerequisite: PHYS 203 or consent of instructor).
Textbook: Physics for Scientists and Engineers, Fishbane et. al., 2005. Addison-Wesley.

PHYS 104L Physics II – Lab: Electromagnetics and Moderns Physics (0+2) 1 – ECTS = 1
Lab work on rotational dynamics and angular momentum; equilibrium and elasticity; periodic motion including LRC electrical circuits; gravitation; fluid mechanics; temperature; thermal expansion; heat and the first law of thermodynamics; heat conduction; kinetic theory of gases; entropy and the second law; heat engines. (Prerequisite: PHYS 203 or consent of instructor).

LIFE 101 Life Sciences I- Biology (3+0) 3 – ECTS = 4
Fundamentals of living creatures, cell structures, bio system; its relation with human activities.

LIFE 102 Life Sciences II- Chemistry (3+0) 3 – ECTS = 4
Basics of matters, elements and their compound under different circumstances. Its relation and

mechanics in human body and surroundings.

MATH 205 Linear Algebra and Differential Equations (2+2) 3 – ECTS = 5
Linear algebra including systems of linear equations; matrices, inverses of matrices; determinants; vector spaces and subspaces, bases and dimension. First order differential equations, including direction fields, separation of variables, first order linear equations, growth and decay, nonlinear models.(Prerequisite: MATH 201 or consent of instructor).
Textbook: Modern Engineering Mathematics, Glyn James, 2008, Prentice Hall.

ENGR 101 Introduction to Programming (2+2) 3 – ECTS = 5
This course will provide a hands-on introduction to programming using Python to students with little or no prior experience in programming computers. The course will focus on creating algoritms with pseudocode as well as the grammar of the Python programming language. Lectures will be interactive featuring inclass exercises with lots of support from the course staff. More advanced concepts in computer programming and software development will be introduced in the later stages of the course. The overarching goal in this course is to build an Engineer mindset in preparation for the upper level courses in engineering curriculum. Learn how to program using Python. Develop skills for understanding and solving computational problems by writing algorithms.

Textbook: Think Python (http://greenteapress.com/thinkpython/)

ENGR 102 Programming Practice (2+2) 3 – ECTS = 5
This course aims to teach widely used problem solving methodologies on real life examples. From filtering spam to recommending movies, books and music to endusers, the course content is mainly based on practical applications. All students are required to complete a set of mini projects which will allow students to practice what they learn in the classroom by building practical applications.

Course contents: Interactive in-class exercises, a set of quizzes, a lot of support from the course staff. Students will be involved in a set of mini projects to improve their practical skills and applying their theoretical understanding on several problems. An interview will follow outlining key highlights of the concerted effort.

Textbook: Programming Collective Intelligence by Toby Segaran. O'Reilly Press (2007, 1st edition).

ENGR 105 Introduction to Engineering (0+2) 1 – ECTS = 2

Introduction to the art and science of engineering through the basics of mechanical, electrical, industrial and computer systems Goals: The objective of this course is to inform the freshmen regarding what they will face (1) during their study at the university and then (2) throughout their professional career so that they may properly orient/develop themselves. During both phases, information research and technical communication skills, including oral presentations, are of utmost importance. Students will be organized in teams for projects and games/competitions as part of coursework.

Texbooks: Moaveni, S. (2011). "Engineering fundamentals, an introduction to engineering". Stamford CT, Cengage Learning. Walesh, S. G. (2000). "Engineering your future". New Jersey, Prentice-Hall. Voland, G. (1999). "Engineering by design". Reading, Massachusetts Addison-Wesley.

CS 201 Data Structures and Algorithms

This course gives an introduction to some of the basic algorithms anddata structures in use on computers today. Particular emphasis is given to algorithms for sorting and searching. The course will concentrate on developing implementations, understanding their performance characteristics, and estimating their potential effectiveness in applications.
Textbook: Algorithms. Sedgewick and Wayne, Fourth Edition, Addison Wesley, 2011.

ENGR 251 Probability for Engineers (2+2) 3 – ECTS = 5
Collection, organization and presentation of data. Introduction to probability theory, counting theorems, conditional probability and independence. Random variables, expectation, discrete probability models, continuous probability models, normal and related distributions. Sampling distributions, central limit theorem. Point and interval estimation. (Prerequisite: MATH 201 or consent of instructor)
Textbook: Applied Statistics and Probability for Engineers 4E, Douglas C. Montgomery and George C.

Runger, John Wiley High Education, 2006.

EECS 201 System Design Fundamentals (3+2) 4 – ECTS = 6

Description: An integrated introduction to electrical engineering and computer science, taught using substantial laboratory experiments on devices with sensing capabilities. Key issues in the design of engineered artifacts operating in the natural world: measuring and modeling system behaviors; assessing errors in sensors and effectors; specifying tasks; designing solutions based on analytical and computational models; planning, executing, and evaluating experimental tests of performance; refining models and designs. Issues addressed in the context of computer programs, control systems, probabilistic inference problems, circuits and transducers, which all play important roles in achieving robust operation of a large variety of engineered systems.

Textbook: http://mit.edu/6.01/mercurial/fall10/www/handouts/readings.pdf

EECS 218 Digital Logic Design (3+0) 3 – ECTS = 5

This course covers the following topics: Digital systems, binary numbers, binary logic, combinational circuits, Boolean algebra, circuit optimization, combinational logic design, arithmetic circuits, sequential circuits, HDL modeling, datapath design, digital hardware implementation, programmable logic components, registers, register transfer logic, memory systems, computer design.

Textbook: M. Morris Mano, Charles R. Kime, Tom Martin "Logic & Computer Design Fundamentals", 5th Edition, Pearson Education

EECS 241 Discrete Mathematics (3+0) 3 – ECTS = 4

Discrete mathematics deals with discrete objects. It builds a foundation for many computer science and electrical engineering subjects such as Formal Languages, Compiler Design, Data Structures, Complexity theory and Circuit Design.

Textbook: Discrete Mathematics by Lovasz and Vesztergombi (1999)

CS 202 Advanced Algorithms (3+0) 3 – ECTS = 5

In this course, students will learn advanced algorithmic approaches applied on practical computer science problems. Divide and conquer, graph algorithms and dynamic programming are taught as a foundation. Later on, linear programming is taught to solve optimization problems. Finally, the students gain an understanding of computationally challenging computer science problems. Course Content: Divide and conquer algorithms, Graph Algorithms, Dynamic Programming, Linear programming.

Textbook: Algorithms by Dasgupta, Papadimitriou and Vazirani, McGraw Hill, 2008.

CS 240 Exploratory Data Analysis (3+0) 3 – ECTS = 4

• Students will be introduced to analyzing data sets by summarizing their main characteristics with visual methods. • Statistical tests that are frequently used to interpret data sets will be explained with examples. • Students will learn to read, clean and transform the data to a useful format. • Students will be trained on developing and testing hypothesis to infer quantitative results from data sets. • Visualization tools that help to find possible relationships and communicate results will be described.

Textbooks: Think Stats: Exploratory Data Analysis in Python Version 2.0.28 Allen B. Downey Green Tea Press Needham, Massachusetts

EECS 202 Basic Digital Communication with Networking (3+2) 4 – ECTS = 6

Description: This lecture is designed as an introductory digital logic design and microprocessor course. Topics covered by this course includes: Binary and non-binary systems, Boolean algebra, digital design techniques, logic gates, logic minimization, standard combinational circuits, sequential circuits, flip-flops, synthesis of synchronous sequential circuits, PLAs, ROMs, RAMs. Principles of hardware and software microcomputer interfacing; Experiments with specially designed laboratory facilities. Assembly language programming. (Lecture and laboratory).

CS 202 Digital Logic Design (3+0) 3 – ECTS = 5

Goals: To grasp the basics of digital logic and computer design using classic and contemporary approaches ranging from Karnaugh maps to hardware description language based formal design methodologies.

Course Content: This course covers the following topics: Digital systems, binary numbers, binary logic, combinational circuits, Boolean algebra, circuit optimization, combinational logic design, arithmetic circuits, sequential circuits, HDL modeling, datapath design, digital hardware implementation, programmable logic components, registers, register transfer logic, memory systems, computer design.

Textbook: M. Morris Mano, Charles R. Kime, Tom Martin "Logic & Computer Design Fundamentals", 5th Edition, Pearson Education

CS 351 Computer Architecture (3+0)3 - ECTS=5

Description: Lectures and labs illustrate how to build a multicore computer system. Topics include parallelism, instruction-set architecture, memory hierarchy, and communication primitives. Using a field-programmable gate array (FPGA) board, programmed with a simple multicore processor and a minimal software environment, students develop Verilog and software to implement different hardware/software designs for caches, messages, shared memory, and coordination primitives. The labs culminate in a term project which students describe in a design paper and in-class presentation. Provides instruction in written and oral communication.
Textbook: http://web.mit.edu/course/6/6.173/

CS 352 Computer Systems (3+0)3 - ECTS=5

Description: Topics on the engineering of computer software and hardware systems: techniques for controlling complexity; strong modularity using client-server design, operating systems; performance, networks; naming; security and privacy; fault-tolerant systems, atomicity and coordination of concurrent activities, and recovery; impact of computer systems on society. Case studies of working systems and readings from the current literature provide comparisons and contrasts. Two design projects. Students engage in extensive written communication exercises.
Textbook: Principles of Computer System Design: An Introduction, by Jerome H. Saltzer and M. Frans Kaashoek. Morgan Kaufmann, 2009.
http://web.mit.edu/6.033/lec/

CS 361 Software (3+0)3 - ECTS=5

Description: This course introduces concepts and techniques relevant to the production of large software systems. Students are taught a programming method based on the recognition and description of useful abstractions. Topics include: modularity; specification; data abstraction; object modeling; design patterns; and testing. Several programming projects of varying size undertaken by students working individually and in groups.
Textbook: Program Development in Java™: Abstraction, Specification, and Object-Oriented Design, by Liskov, Barbara, and John Guttag. Addison-Wesley, 2000.
http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-170-laboratory-in-software-engineering-fall-2005/lecture-notes/

CS 381 Object Oriented Programming (3+0)3 - ECTS=5

Goals: This course will introduce the fundamentals of Object Oriented concepts and how to use them. Course Content: Introduction,Classes, Class relationships,Methods and Messages, Inheritance and Software reuse, Polymorphism, Applications of Polymorphism, Object interactions

Textbook: An Introduction to Object-Oriented Programming, by Timothy Budd, Addison-Wesley Pub. 3rd edition, 2002.

CS 340 Computer Systems (3+0)3 - ECTS=5

Goals: This class teaches you how to work with a big data set. Learning Outcomes: 1. Get a hands on experience on how to use cluster computing principles, tools, and techniques on Apache Spark. 2.

Learn how to use Spark for making sense of an important dataset. 3. Improve presentation skills by presenting the data problem studied before class.

Textbook: Learning Spark by Holden Karau, Andy Konwinski, Patrick Wendell, and Matei Zaharia. O'Reilly 2015.

CS 350 Database Systems (3+0)3 - ECTS=5

Goals: To empower students with ability to study fundamentals of database systems and from these fundamentals, ability to design and operate modern databases.

Textbook: Database Systems 3th edition, Raghu Ramakrishnan and Johannes Gehrke, Pearson.

CS 364 Computer Networks (3+0)3 - ECTS=5

Course Objectives: - Using the Internet as a vehicle, this course introduces the underlying concepts and principles of modern computer networks with emphasis on protocols, architectures, and implementation issues. - Students will explore layering in computer networks and understand different protocol stacks (OSI and TCP/IP). - Students will be trained on functions and protocols within a layer, understand how layers fit together and finally understand how the Internet works.

Textbook: James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach", Pearson, 6th edition.

ENGR 497 Global Design Project I (1+2) 2 - ECTS=9

Description: Investigation and report on a special project under the direction of a faculty advisor. Involves handling and solving a well defined engineering problem of practical nature fully by applying a synthesis of knowledge and skills acquired in different courses in a particular branch of engineering.
Textbook: None required.

ENGR 498 Global Design Project II (1+2) 2 - ECTS=9

Description: Investigation and report on a special project under the direction of a faculty advisor. Involves handling and solving a well defined engineering problem of practical nature fully by applying a synthesis of knowledge and skills acquired in different courses in a particular branch of engineering.
Textbook: None required.

CS 371 Data Structures and Algorithms (3+0)3 - ECTS=5

Description: This course provides an introduction to mathematical modeling of computational problems. It covers the common algorithms, algorithmic paradigms, and data structures used to solve these problems. The course emphasizes the relationship between algorithms and programming, and introduces basic performance measures and analysis techniques for these problems.
Textbook: Introduction to Algorithms, 2nd Edition, by Cormen, Leiserson, Rivest, and Stein. MIT Press, 2001.
http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-spring-2008/lecture-notes/

CS 372 Advanced Algorithms (3+0) 3 - ECTS=5

Description: This course teaches techniques for the design and analysis of efficient algorithms, emphasizing methods useful in practice. Topics covered include: sorting; search trees, heaps, and hashing; divide-and-conquer; dynamic programming; amortized analysis; graph algorithms; shortest paths; network flow; computational geometry; number-theoretic algorithms; polynomial and matrix calculations; caching; and parallel computing.
Textbook: Introduction to Algorithms, 2nd Edition, by Cormen, Leiserson, Rivest, and Stein. MIT Press, 2001.
http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-spring-2008/lecture-notes/http://stellar.mit.edu/S/course/6/fa10/6.046/materials.html

ENGR 422 - Numerical Analysis for Engineers (3+0) 3 – ECTS = 5

The numerical methods for solving engineering problems are studied. The numerical representation of numbers and the sources of error are discussed. Solution methods for the roots of equations, linear

algebraic equations, numerical differentiation and integration, ordinary and partial differential equations, regression and interpolation are studied. Basics in MATLAB are covered and numerical programming applications are offered.
Textbook: Numerical Methods for Engineers, 6th Edition Steven Chapra, Raymond P. Canale, Mc Graw Hill, 2010.

EECS 402 Entrepreneurship (3+0)3 - ECTS=5
Description: Successful startups do not follow the traditional product-centric launch model. Through trial and error, hiring and firing, successful startups all invent a parallel process to Product Development. This process is focused on customer learning and discovery, and is called Customer Development. Students learn A-to-Z aspects of this radical reexamination of new product introduction process, successful strategies to listen to your customers and addressing their needs head first before product launch, and effective market validation.
Textbook: The Four Steps to the Epiphany, 2nd edition, by Steven G. Blank. Cafepress, 2006.

EECS 403 Digital Circuit Design (3+0) 3 – ECTS = 5
Description: This lecture provides the design and analysis of digital integrated circuits. In particular it focuses on Logic families, comparators, A/D and D/A converters, combinational systems, sequential systems, solid-state memory, large-scale integrated circuits, and design of electronic systems. Parasitics, transmission-line effects, packaging. Analog to Digital interfaces. Linear and switching mode power conversion.

EECS 404 Communication Circuits (3+0) 3 – ECTS = 5
Description: The course covers a brief review of analog and digital communication concepts, contemporary receiver transmitter architectures for modern wired and wireless communication systems, delay-locked loops (DLLs), fractional-N synthesizers, phase locked loops and clock recovery circuits. The course involves design and CAD activity.

EECS 405 RF Circuit Design (3+0) 3 – ECTS = 5
Description: The course provides thorough introduction to the fundamental concepts of RF design, including nonlinearity, interference and noise. Modulation and detection theory; multiple access techniques, and circuits pertinent to current wireless networks. The course also involves CAD activity.

EECS 413 Wireless Communications (3+0) 3 – ECTS = 5
Description: Introduction to wireless communications systems. Wireless channel modeling. Single carries, spread spectrum, and multi-carrier wireless modulation schemes. Diversity techniques. Multiple-access schemes. Transceiver design and system level tradeoffs. Brief overview of GSM, CDMA, 3G and other wireless standards.

EECS 415 Digital Signal Processing (3+0) 3 – ECTS = 5
Description: Introduction to discrete Fourier series and transforms. Design of Analog and digital filters. Fast-Fourier transforms, sampling, and modulation for discrete time signals and systems. Consideration of stochastic signals and linear processing of stochastic signals using correlation functions and spectral analysis. Introduction to Matlab tools and matlab based signal processing projects.

EECS 416 Image and Video Processing (3+0)3 - ECTS=5
Description: This course is divided into two parts: digital image processing and digital video processing. The first part covers the fundamentals of digital image processing such as image sampling and quantization, color, point operations, segmentation, morphological image processing, linear image filtering and correlation, image transforms, eigenimages, multiresolution image processing, wavelets, noise reduction and restoration, feature extraction and recognition tasks, and image registration. The second part of the course covers the fundamentals of digital video processing, which include spatio-temporal sampling, motion analysis, parametric motion models, motion-compensated filtering, and video processing operations including noise reduction, restoration, superresolution, deinterlacing and video sampling structure conversion, and compression (frame-based and object-based methods).
Textbook:
"Video Processing and Communications" by Yao Wang, Joern Ostermann, and Ya-Qin Zhang, Prentice Hall, 2002, ISBN 0-13-017547-1.

"Fundamentals of Digital Image Processing" by A.K.Jain, Prentice-Hall, 1989.

EECS 418 Information Theory (3+0)3 - ECTS=5
Description: Information theory is the science of operations on data such as compression, storage, and communication. It is among the few disciplines fortunate to have a precise date of birth: 1948, with the publication of Claude E. Shannon's paper entitled "A Mathematical Theory of Communication". This course will explore the basic concepts of Information theory. It is a prerequisite for research in this area, and highly recommended for students planning to delve into the fields of communications, data compression, and statistical signal processing. The intimate acquaintance that we will gain with measures of information and uncertainty - such as mutual information, entropy, and relative entropy - would be invaluable also for students, researchers, and practitioners in fields ranging from neuroscience to machine learning. Also encouraged to enroll are students of statistics and probability, who will gain an appreciation for the interplay between information theory, combinatorics, probability, and statistics.
Textbook: Elements of Information Theory by Cover and Thomas, 2nd Edition, New York: Wiley, 2006.

EECS 421 Antennas and Propagations (3+0) 3 – ECTS = 5
Description: Basic theory of radiation. Analysis and synthesis of antennas and antenna arrays. Adaptive arrays and digital beam forming for advanced wireless links. Friis transmission formula. Wireless communication equations for cell site and mobile antennas, interference, slow and fast fading in mobile communication.

EECS 423 Optics (3+0) 3 – ECTS = 5
Description: Basic principles of optics: light sources and propagation of light; geometrical optics, lenses and imaging; ray tracing and lens aberrations; interference of light waves, coherent and incoherent light beams; Fresnel and Fraunhofer diffraction. Overview of modern optics.

EECS 424 Photonics and Lasers (3+0) 3 – ECTS = 5
Description: Wave theory of light, optical waveguides and fibers, optical transmission system, heterojunction structures, laser theory, semiconductor lasers, photodiodes and optical detection, photometry and radiometry.

EECS 451 Database Systems (3+0)3 - ECTS=5
Description: This course relies on primary readings from the database community to introduce graduate students to the foundations of database systems, focusing on basics such as the relational algebra and data model, schema normalization, query optimization, and transactions. Topics related to the engineering and design of database systems, including: data models; database and schema design; schema normalization and integrity constraints; query processing; query optimization and cost estimation; transactions; recovery; concurrency control; isolation and consistency; distributed, parallel, and heterogeneous databases; adaptive databases; trigger systems; pub-sub systems; semi structured data and XML querying.
Textbook:
Readings in Database Systems, 4th edition, by Hellerstein, Joseph M., and Michael Stonebraker. MIT Press, 2005.
Database Management Systems, 2nd edition, by Ramakrishnan, Raghu, and Johannes Gehrke. McGraw-Hill, 2000.
http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-830-database-systems-fall-2005/lecture-notes/

EECS 456 Principles of Computer Systems (3+0)3 - ECTS=5
Description: This course provides an introduction to the basic principles of computer systems, with emphasis on the use of rigorous techniques as an aid to understanding and building modern computing systems. Particular attention is paid to concurrent and distributed systems. Topics covered include: specification and verification, concurrent algorithms, synchronization, naming, networking, replication techniques (including distributed cache management), and principles and algorithms for achieving reliability.
Textbook: http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-826-principles-of-computer-systems-spring-2002/lecture-notes/

EECS 457 Performance Engineering of Software Systems (3+0)3 - ECTS=5

Description: Modern computing platforms provide unprecedented amounts of raw computational power. But significant complexity comes along with this power, to the point that making useful computations exploit even a fraction of the potential of the computing platform is a substantial challenge. Indeed, obtaining good performance requires a comprehensive understanding of all layers of the underlying platform, deep insight into the computation at hand, and the ingenuity and creativity required to obtain an effective mapping of the computation onto the machine. The reward for mastering these sophisticated and challenging topics is the ability to make computations that can process large amount of data orders of magnitude more quickly and efficiently and to obtain results that are unavailable with standard practice. This course is a hands-on, project-based introduction to building scalable and high-performance software systems. Topics include: performance analysis, algorithmic techniques for high performance, instruction-level optimizations, cache and memory hierarchy optimization, parallel programming, and building scalable distributed systems.
Textbook: http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-172-performance-engineering-of-software-systems-fall-2009/lecture-notes/

EECS 461 Machine Learning (3+0)3 - ECTS=5
Description: This course is an introductory course on machine learning which gives an overview of many concepts, techniques, and algorithms in machine learning, beginning with topics such as classification and linear regression and ending up with more recent topics such as boosting, support vector machines, hidden Markov models, and Bayesian networks. The course will give the student the basic ideas and intuition behind modern machine learning methods as well as a bit more formal understanding of how, why, and when they work. The main theme in the course is statistical inference that provides the foundation for most of the methods covered.
Textbook: Pattern Classification, 2nd edition, by Duda, Richard, Peter Hart, and David Stork. Wiley-Interscience, 2000.
http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-867-machine-learning-fall-2006/lecture-notes/

EECS 464 Computer Vision (3+0)3 - ECTS=5
Description: Application of computer vision techniques to consumer-level applications such as stitching, exposure bracketing, morphing, etc. will be the focus. Topics covered will include an overview of problems in computer vision, image formation, image processing, feature detection and matching, segmentation, dense motion estimation, and stereo correspondence as time permits.
Textbook: Computer Vision: Algorithms and Applications, by Richard Szeliski. Springer, 2010.

EECS 465 Introduction to Robotics (3+0)3 - ECTS=5
Description: This is a course on modeling, design, planning and control of robot systems. It surveys results from geometry, kinematics, statics, dynamics and control theory.
Textbook: Introduction to Robotics: Mechanics and control, John J. Craig. Prentice Hall, 2005.

EECS 468 Bioinformatics (3+0)3 - ECTS=5
Description: This course is an algorithmic principles driving in bioinformatics. It emphasizes the relatively few design techniques used in diverse range of practical problems in biology such as DNA mapping, genome rearrangements, statistical methods for gene prediction and molecular evolution.
Textbook: An introduction to Bioinformatics, Jones and Pevzner. MIT Press, 2005.

EECS 471 Distributed Algorithms (3+0)3 - ECTS=5
Description: This course provides an introduction to the most important basic results in the area of distributed algorithms, and prepare interested students to begin independent research or take a more advanced course in distributed algorithms. Distributed algorithms are algorithms designed to run on multiple processors, without tight centralized control. In general, they are harder to design and harder to understand than single-processor sequential algorithms. Distributed algorithms are used in many practical systems, ranging from large computer networks to multiprocessor shared-memory systems. They also have a rich theory, which forms the subject matter for this course. The core of the material will consist of basic distributed algorithms and impossibility results. This will be supplemented by some updated material on topics such as self-stabilization, wait-free computability, and failure detectors, and some new material on scalable shared-memory concurrent programming.
Textbook: Distributed Algorithms, by Lynch, Nancy. Morgan Kaufmann, 1996.
http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-852j-distributed-algorithms-fall-2009/lecture-notes/

EECS 474 Networks (3+0)3 - ECTS=5
Description: Networks are ubiquitous. Internet that links us to and enables information flows with the rest of the world is the most visible example. Our society is organized around networks of friends and colleagues. These networks determine our information, influence our opinions, and shape our political attitudes, and link us to everybody else in Turkey and in the world. Economic and financial markets look much more like networks than anonymous marketplaces. Firms interact with the same suppliers and customers and use Web-like supply chains. Financial linkages, both among banks and between consumers, companies and banks, also form a network over which funds flow and risks are shared. Systemic risk in financial markets often results from the counterparty risks created within this financial network. Food chains, interacting biological systems and the spread and containment of epidemics are some of the other natural and social phenomena that exhibit a marked networked structure. This course will introduce the tools for the study of networks. It will show how certain common principles permeate the functioning of these diverse networks and how the same issues related to robustness, fragility, and interlinkages arise in different types of networks.
Textbook:
Networks, Crowds, and Markets: Reasoning about a Highly Connected World, by Easley, David, and Jon Kleinberg.Cambridge University Press, 2010.
Social and Economic Networks, by Jackson, Matthew O. Princeton University Press, 2008.
http://ocw.mit.edu/courses/economics/14-15j-networks-fall-2009/lecture-notes/

EECS 481 Introduction to Cryptography (3+0)3 - ECTS=5
Description: This is an introductory course on methods, algorithms, techniques, and tools of cryptography. We study in detail algorithmic and mathematical aspects of cryptographic methods and protocols, such as secret-key cryptography, public-key cryptography, hash functions, and digital signatures. We show how these techniques are used to solve particular data and communication security problems. This course material is useful for computer science, electrical engineering, and mathematics students who are interested in learning how cryptographic algorithms and methods are embedded in information systems, providing confidentiality, integrity, non-repudiation, and authenticity of stored and transmitted digital data.
Textbook:
Introduction to Cryptography, by J. A. Buchmann. Springer, 2004.
Computer Security and Cryptography, by A. G. Konheim. Wiley, 2007.
The Design of Rijndael, by J. Daemen and V. Rijmen. Springer, 1998.
Public-Key Cryptography, A. Salomaa. Springer, 1996.

EECS 482 Cryptographic Engineering (3+0)3 - ECTS=5
Description: This is a graduate course is designed for computer science, mathematics, electrical engineering students interested in understanding, designing, developing, testing, and validating cryptographic software and hardware. We will study algorithms, methods, and techniques in order to create state-of-art cryptographic embedded software and hardware using common platforms and technologies.
Textbook: Cryptographic Engineering, by C. K. Koc. Springer, 2009.

EECS 483 Network Security (3+0)3 - ECTS=5
Description: In this course, we study the theoretical and practical aspects of network security. We start with a threat model, and describe vulnerabilities of computer networks to attacks by adversaries and hackers using a variety of techniques. We then study methods and techniques to circumvent or defend against these attacks and to minimize their damage. In this context, we study cryptographic techniques and protocols, network security protocols, digital signatures and authentication protocols, network security practice, and wireless network security. Security attacks, mechanisms, and services. Network security and access security models. Overview of secret-key and public-key cryptography. Authentication protocols and key management. Network security practice. Email security. IP security and web security. Intrusion detection and prevention systems. Firewalls and virtual private networks. Wireless network security.
Textbook: Network Security, 2nd Edition, C. Kaufman, R. Perlman, M. Speciner. Prentice Hall, 2002.