**DEBRE MARKOS UNIVERSITY**

**COLLEGE OF POST GRADUATES**

**COURSE SYLLABI FOR SECOND SEMESTER COURSES\_ SEM.II/2012EC**

**COLLEGE/SCHOOL/INSTITUTE: Technology**

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| Department | Program Name | Course details | Remark |
|  HWRE  | Course Title and code | Course code  | CrHr | Course description |  |
| Hydraulic and water resource Engineering  | Sediment transport mechanics  | HWRE6022 | 3 | Introduction to sediment transport in Rivers. River Hydraulics; Overview of Open Channel Flow, Conservation equations, Types of open channel flow, Estimating Flow velocities and bed shear stress in Rivers, The one dimensional equation of Hydraulics, velocity profiles, Flow resistance and shear stress partitioning. Bed sediment entrainment and transport; Forces on sediment particles, Incipient motion and critical shear stress, Estimating transport rates, Armouring and sediment supply effects, Sediment transport and channel change, Conservation of sediment mass and Exener equation. Channel Morphology; The bankful channel, hydraulic geometry, flow regime and dominant discharge, Bars and Meandering, Multi-thread channels, River long profiles, graded streams, base level, downstream fining .Sediment samplers and sampling . Resistance to flow and velocity distribution in alluvial streams. Design of stable channels. Numerical Modelling of Sediment Transport. Reservoir sedimentation.  One Dimensional river modeling  |  |
| Hydraulic Structures II  | HWRE6024 | 3 | Design of outlook works, intake structure, gates and valve, terminal structures, entrance and out let channelsDesign and analysis of spill ways structuresCrest gets design and analysisScour protection and energy dissipation, hydraulic pump, stilling basins and stilling chambers Irrigation distribution and lay out and canal regulation structures Cross drainage structures Distribution channels flumes and siphons control gates  |  |
| Groundwater Hydrology  | HWRE6032 | 3 | Occurrence of groundwater; hydrological properties and structure of aquifers.Groundwater hydraulics: transmissivity and storage coefficient, equilibrium and no equilibriumGoverning equation of groundwater flowWell hydraulics, radius of influence, maximum and specific capacity, and interference between wells and aquifer boundaries.Pumping test and estimation of aquifer parameters.Evaluation of groundwater resource: safe yield, recharge area, groundwater reservoir management.Groundwater flow modeling |  |
| Design and Analysis of Embankment dam  | HWRE6026 | 3 | Types of earth dams.Geotechnical engineering of embankment dams, zoning of embankment dams, site investigations planning and techniques, seepage control measures, and the design, specification and construction of filters. Stability analysis under normal loads for embankment dams.Foundation preparation, clean up and grouting. Detailing of embankment dams.Specification and quality control. Design of embankment dams for earth quake, earth quake in Ethiopia, selection of design earth quake, general design principles, defensive design.Analysis of dynamic stability and deformations of embankment dams. Assessment of liquefaction potential and post liquefaction behavior. Design of remedial measures.Exploration, methods of construction requirements of foundations and materials of construction quality control, causes of failure and criteria for safe design, control of seepage, deformation of predication, stability analysis under steady seepage and draw down conditions, seismic stability, cracking and its control on fault zones |  |
|  |  | Hydropower Engineering  | HWRE 7021 | 3 | Classification of hydropower plants: low, medium, and high-head plants.Practical approach to the planning and design of hydroelectric power installation: hydropower development cycle: pre-construction (planning), implementation (engineering, construction and supply) and operation (management and operation of hydropower installation).Fundamental theory of water availability and demand: flow, power and load duration curves.Design of hydropower plants: intakes, power canals, forebay, surge in power canals and penstocks, surges tanks, waterClassification of hydropower plants: low, medium, and high-head plants.  |  |

**Debre Markos University**

**College of Post Graduates**

**Course Syllabi for Second Semester Courses: Sem II/2012 E.C**

**School: Computing**

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| **A/P** | **Program****Name** | **Course Details** | **Remark** |
| **Course Title** | **Course Code**  | **CrHr** | **Course Description** |  |
| IT | IT | Machine Learning | ITec5142 | 3 | Machine learning is the study of computer algorithms and models that learn automatically from data. It is a key area of artificial intelligence and has applications in many domains, including biology, social science, statistics, and image processing. The course explains how to build systems that learn and adapt using real-world applications. Some of the topics to be covered include concept learning, neural networks, genetic algorithms, reinforcement learning, instance-based learning, and so forth. The course focuses to provide students with an in-depth introduction to two main areas of Machine Learning: supervised and unsupervised. This introductory course covers key topics in machine learning, including linear models for regression and classification, decision trees, support vector machines and kernel methods, neural networks and deep learning, ensemble methods, unsupervised learning and dimension reduction The course will use primarily the Python programming language to create a successful machine-learning application with Python and the scikit-learn library. |  |
| Wireless Communications & Mobile Computing | ITec5152 | 3 | This course gives a background on networking concepts and then explains the wireless communications at all layers of networking protocol stack. These concepts include but not limited to different protocols for Wireless Networks and Wireless LAN, Mobile IP, Routing and MAC Protocols for Mobile Ad hoc and Sensor Networks. The courses focus on developing mobile based applications and evaluate the performance of existing mobile based applications. The emergence of mobile phone proved opportunities to alleviate various economic and social problems in developing countries thus this course is stipulated to solve the existing socioeconomic problem of the society. The main focuses of the course project is to integrate mobile on different application domains: health, agriculture, education etc. Besides, students are expected to conduct research the application and impact of mobile based application in order to improve the living conditions of rural people.  |  |
| Big Data Analytics | ITec5162 | 3 | This course covers basic, intermediate and advanced topics in the arena of multimedia. The contents of the course can be categorized into three. Multimedia Authoring and Data Representations part introduces some of the notions included in the term multimedia and look at its history as well as its present. Multimedia data compression section in other hand deals about how we can make all this data fly onto the screen and speakers. The last section is regarding multimedia communication and retrieval. Here great demands multimedia places on networks and a system is considered. |  |
| Image Processing | ITec5212 | 3 | This course is an introduction to the fundamental concepts and techniques in basic digital image processing and their applications to solve real life problems. The topics covered include Digital Image Fundamentals, Image Transforms, Image Enhancement, Restoration and Compression, Morphological Image Processing, Nonlinear Image Processing, and Image Analysis. Application examples are also included. |  |

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**COLLEGE/SCHOOL/INSTITUTE: Technology**

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| --- | --- | --- | --- |
| Department | Program Name | Course details | Remark |
|  Electrical and computer Engineering  | Course Title | Course code  | CrHr | Course description |  |
| Computer Engineering  | Cryptography and Network Security | **ECEG-6412** | 3 | 1. Introduction
* Security goals
* Attacks
* Services
* Mechanisms
* Model for Network Security
1. Conventional Encryption
* Classical Encryption techniques
* Block ciphers
* Data encryption standard
* Advanced encryption Standard
1. Public Key Cryptography
* Public-Key Cryptography Principles
* RSA
* Key Management
1. Cryptographic Data integrity algorithms
* Cryptographic Hash Functions
* Message Authentication Codes
* Digital Signatures
1. Network Security Applications
* Kerberos Motivation
* Kerberos Version 4
* PGP Notation
* PGP Operational Description
1. Security in layers and domains
* IP Security
* Secure Socket Layer (SSL)
* E-mail Security
* Overview of Secure Electronic Transaction
1. Intruders and Viruses
* Intruders
* Intrusion Techniques
* Password Protection
* Password Selection Strategies
* Intrusion Detection,
* Malicious Programs
* Nature of Viruses
* Types of Viruses
* Macro Viruses
* Antivirus Approaches
1. Firewalls
* Firewall Characteristics
* Types of Firewalls

Firewall Configuration |  |
| **Advanced VLSI Design** | **ECEG-6424** | 3 | 1. Introduction to CMOS circuits
* MOS Transistors
* CMOS Logic
* The inverter
* Combinational Logic(NAND gate, NOT Gate, Compound Gates, Multiplexers)
* Memory-Latches and Registers
1. Processing Technology
* Silicon Semiconductor Technology: An Overview, wafer processing, oxidation, deposition, Ion-implantation and diffusion
* The Silicon Gate Process: Basic CMOS Technology, basic n-well CMOS process, p-well CMOS process, Twin tub process, Silicon on insulator, CMOS process enhancement-Interconnect, circuit elements, 3-D CMOS.
* Layout Design Rule: Layer Representations, CMOS n-well Rules, Design Rule of background scribe line, Layer Assignment, SOI Rule
1. Implementation of combinational and sequential logic
2. Interconnects
3. Memories
* SRAM
* DRAM
* emerging nonvolatile memories
* peripherals and array architecture
1. VLSI System Design
* General system components
* system design flow
* VLSI clocking
* power supply
* Input/output
1. CAD tools for layout, simulation, and validation
2. Design a VLSI chip using modern CAD tools

Current/Future Challenges in VLSI Design |  |
| **Advanced Embedded Systems Design** | **ECEG-6436** | 3 | 1. Understanding Embedded Systems
* Overview of Processors & Microcontrollers
* Memory (RAM, ROM, EPROM, EEPROM, FLASH)
* I/O Interfaces
* Host & Target Development environment
* Cross Compilers
* Downloading Techniques
1. AVR Microcontroller
* Architecture
* Addressing modes
* Instruction Set
* C Language Programming
1. PIC Microcontroller
* Architecture
* Addressing modes
* Instruction Set
* C Language Programming
1. Programming Environment
* Data Structures Embedded Systems Design
* Implementation and Testing
* Embedded Network Protocols: Issues and Applications
* Security Issues in Embedded Systems
* Video and Audio Standards
1. Real Time Operating Systems
* Introduction to OS (memory, I/O, Files,... management and others issues)
* Introduction to Real-Time / Embedded Operating Systems
* Real Time Scheduling
* Performance Metrics of RTOS
1. Wireless Embedded System Design
* Protocol Design and Validation
* Network Embedded Systems
* Bluetooth and IrDA
* Wireless Sensor Networks and ZigBee
* Wireless LAN - IEEE 802.11
* RFID
* GSM and GPRS

Ubiquitous Computing  |  |
| **Mobile Computing and Wireless Networking** | **ECEG-7443** | 3 | 1. Overview of wireless Communications and Networking
* Historical overview of wireless communications.
* Challenges in wireless communication networking: The wireless channel and User mobility.
* Wireless communication standards: First generation cellular systems, second generation cellular systems, third generation wireless communication networks, and coverage extension.
1. Wireless Network Configurations
* Wireless LANs, MANs, and WANs.
* Wireless LAN architecture: MAC-sublayer and Physical layer.
* Wireless LAN components and systems: end user appliances, network software, wireless network interface cards, wireless local bridges, and the communication channel.
* Multiple cell wireless LANs.
1. Mobility Management in Wireless Networks
* Introduction.
* Call admission control.
* Handoff management.
* Location management for cellular networks.
* Location management for PCS networks.
* Traffic calculation: system and traffic parameters, and handoff rate calculation.
1. Wireless Internet
* Introduction.
* What is wireless Internet? (address mobility, inefficiency of Transport and Application protocols)
* Mobile IP: operation of mobile IP, hierarchical routing, handoffs, mobile IPv6, and security in mobile IP.
* Transmission control protocol (TCP)in wireless domains: flow control, mobile TCP, mobile UDP, and impact of mobility.
* Wireless Application Protocol (WAP): wireless application environment, WAP stack, and WAP gateway.
1. Ad Hoc wireless Networks
* Introduction: cellular and Ad Hoc wireless networks, and applications of Ad Hoc wireless networks.
* Issues in ad Hoc wireless networks: medium access scheme, routing, multicasting, transport layer protocol, addressing and service discovery, energy management, and scalability.
* Ad Hoc wireless Internet.
* MAC protocols for Ad Hoc wireless networks: contention-based protocols, contention-based protocols with reservation mechanisms, and contention-based protocols with scheduling mechanisms.

Routing protocols for Ad Hoc wireless networks: Issues in designing a routing protocol (e.g. mobility, BW constraint, resource constraints, etc.), destination sequenced distance-vector* routing protocol, cluster- head gateway switch routing protocol, dynamic source routing protocol, ad hoc on- demand distance vector routing protocol, temporally ordered routing algorithm, and power- aware routing protocol.
1. Energy Management in Ad Hoc Wireless Networks
* Introduction: needs for energy management.
* Battery management schemes(e.g. device-dependent scheme, data link layer solutions, and network layer solutions).
* Transmission power management schemes(e.g. data link layer solutions, network layer solutions, and higher layer solutions).
* System power management schemes( processor power management schemes, and device power management schemes).
1. Wireless Sensor Networks
* Introduction: application of sensor networks, and comparison with ad hoc wireless networks.
* Sensor network architecture: layered and clustered architectures.
* Data dissemination: flooding, gossiping, rumor routing, and small minimum energy communication network.
* MAC protocols for sensor networks: hybrid TDMA/FDMA , and CSMA-based MAC protocols.
* Location discovery: indoor localization , and sensor network localization.
* Quality of a sensor network: coverage, and exposure

Other issues: energy- efficient- design, synchronization, transport layer issues, and real time communication. |  |
|  | **Scientific Research Methods** | **ECEG-7423** | 2 | 1. Introduction and Overview of Research
* What is Research and not Research?
* Scientific Research
* Objectives, Motivations and Significance of Research
* Requirements and Characteristics of Research
* Types and Approaches of Research
* Research Methods and Problem Solving
* Effective Report Writing Principles and Criteria for Good Research
* Evaluating and Reviewing Research Results
* What is Research in Computing?
1. Processes in Conducting Research
* Overview of Current State of the Art Areas and Techniques in Computing
* Actors, Roles and Relationship (The Student, The Supervisor , The Examiner/Evaluator)
* The Process
* Developing Research Proposal

Developing Problem Description * Following the objectives
* Presenting and Analyzing the Data
* Drawing Conclusion and Identifying Future Work
* Presenting and Defending Orally
* Preparing Final Research Documentation (Thesis)
* Proposal Preparation
* Choosing a Subject Area
* Choosing a Problem within the Subject Area
* Quality Assurance of Initial Ideas
* Write Research Proposal
* Sample and More Acceptable Research Proposal Structure
* Research Proposal Check-list
* Literature Reviews
* Importance and Roles of Literature Review
* Skills and Keys to Effective Literature Review
* Literature Sources (Journals, Conference Proceedings, Books, Reports, Thesis, etc. )
* Literature Review Writing
* Assessment Criteria
1. Resources to Conduct Research
* Digital Libraries (IEEE, ACM, Science Direct, Springer, etc.)
* Documentation Tools (Ex: Latex) and Language Skill
* Team Work
* Datasets
* Simulation, Experimental or Visualization Tools
1. Writing Research Papers and Making Presentations
* Structure of Good Quality Papers, Citations and References
* Making Excellent Presentation

How to Write Good Quality Thesis and Papers (Journal and * Conferences)
1. Research Ethics
* Ethical Issues in Research
* Plagiarism, Falsification, Fabrication
* Academic Honesty Related Issues – Ex. Misleading Authorship
* Other Ethical Issues in Computing

Data Collection and Analysis (Presentation of Research Results such as Data Figures) |  |