Faculty of Information Technology

Department of Software

Short Description for the Study Plan 2014-2015 (Software Engineering Major)

0111101 Mathematics (I) {3} [3-3]

Review of Basic Algebra; Functions, Limits and Continuity; Derivatives of Algebraic, Trigonometric, Exponential and Logarithmic Functions; Graphs; Related Rates Problems; Maximum-minimum Problems; Indefinite Integral; Definite Integral and Applications with Emphasis on Engineering and Pharmacy models.

Prerequisite: None

0331200 Computer Skills (Remedial) {3} [3-3]

IT Essentials: Introduction to Personal Computer, Computer Assembly, An Overview of Preventive Maintenance; Operating System (WINDOWS 10): Settings, Managing Folders and Files, Search; Basics Skills in Microsoft Word 2016; Basics Skills in Microsoft PowerPoint 2016; Basics Skills in Microsoft Excel 2016.

Prerequisite: None

0311203 Introduction to Programming {2} [2-2]

Introduction to Computers, Programming, and Java; Elementary Programming: Identifiers, Constants, Variables, Assignment Statements and Expressions, Data Types, Operators, Numeric Type Conversions; Selection Statements: Boolean Expressions, If Statements, Logical Operators, Switch Statement, Conditional Operator; Mathematical Functions, Characters, and Strings; Loops: while Loop, do-while Loop, for Loop; Arrays; Methods.

Prerequisite: 0331202 Computer Skills (Information Technology)

0311204 Introduction to Programming Lab {1} [1-2]

Laboratory sessions on the different aspects and topics of programming using Java: Elementary Programming: Identifiers, Constants, Variables, Assignment Statements and Expressions, Data Types, Operators, Numeric Type Conversions; Selection Statements: Boolean Expressions, If Statements, Logical Operators, Switch Statement, Conditional Operator; Mathematical Functions, Characters, and Strings; Loops: while Loop, do-while Loop, for Loop; Arrays; Methods.

Concurrent: 0311203 Introduction to programming

0311205 Object Oriented Programming {3} [3-3]

Introduction to Object Oriented Programming concepts using JAVA language: Classes, Objects, Constructors, Overloading Methods, Encapsulation, Packages; Relationships between Classes: Composition, Inheritance, Overriding, Polymorphism; Abstract classes and Interfaces; introduction to GUI programming.

Prerequisite: 0311203 Introduction to Programming

0311206 Object Oriented Programming Lab {1} [1-2]

Laboratory sessions on the different concepts of Object Oriented Programming using JAVA language: Classes, Objects, Constructors, Overloading Methods, Encapsulation, Packages; Relationships between Classes: Composition, Inheritance, Overriding, Polymorphism; Abstract classes and Interfaces; introduction to GUI programming.

Concurrent: 0311205 Object Oriented Programming

0312101 Discrete Mathematics {3} [3-3]

Logic; Sets; Relations; Functions; Sequences; Induction and Recursion; Counting Techniques; Graphs: Euler Cycles, Hamilton Cycles; Trees; Maple Labs.

Prerequisite: None

0331202 Computer Skills (Information Technology) {3} [3-3]

Introduction to Computers, Programming, and C# Programming; Introduction to Problem Solving Using Flow Charts; Introduction to Programming: Identifiers, Variables, Assignment Statements and Expressions, Data Types, Operators, Type Conversions; Selection Statements: Boolean Expressions, If Statements, Logical Operators, Switch Statement, Conditional Operator; Loops: while Loop, do-while Loop, for Loop; Arrays.

Concurrent*:* 0331200 Remedial Computer Skills

0332602 Communication Skills and Technical Writing {3} [3-3]

Basics of Communication Skills: Communication Process, Language as a Tool of Communication, Verbal and Non-Verbal Communication, Barriers to Communication; Listening Skills: Types of Listening, Barriers to Effective Listening; Speaking Skills: Strategies for Developing Speaking Skills, Barriers to Effective Speaking, Types of Speaking, Effective Presentation Strategies; Reading Skills: Reading Techniques, Reading Comprehension; Writing Skills: Attributes of Technical Writing, Benefits of Technical Writing, Types of Writing, Research Papers, Technical Reports, Job Application.

Prerequisite*:* 0121131 English Communication Skills (1)

0334402 Entrepreneurship and Professional Ethics {3} [3-3]

The Entrepreneurial Process; Recognizing Opportunities and Generating Ideas; Feasibility Analysis; Developing an Effective Business Model; Industry and Competitor Analysis; Writing a Business Plan; The Importance of Business Ethics; Stakeholder Relationships, Social Responsibility, and Corporate Governance; Ethical Decision Making and Ethical Leadership; Organizational Factors: The Role of Ethical Culture and Relationships; Case studies.

Prerequisite*:* 0332602 Communication Skills and Technical Writing

0342102 Data Structures {3} [3-3]

Lists: Static Allocation, Dynamic Allocation; Stacks: Static Implementation, Linked Implementation, Operations, Applications; Recursion: Applications, Program Stack; Queues: Static Implementation, Linked Implementation, Operations, Applications; Binary Search Trees: Traversal, Search, Add and Delete Operations; Files: Input, Output; Graphs: Traversal, Adjacency Matrix, Adjacency List.

Prerequisite: 0311205 Object Oriented Programming

0332401 Introduction to Software Engineering {3} [3-3]

System development life cycle: Waterfall, Prototype, Incremental, and Spiral; Principles of software engineering: Requirements analysis and design; Review of principles of object orientation; Object oriented analysis using UML; Behavioral UML diagrams: Use case, Sequence, Activity, and State diagrams; Structural UML diagrams: Object, Class, and Package diagrams; Object Oriented Design: Abstraction, Coupling, Cohesion, Decomposition, Encapsulation, Separation of Interface, and Implementation; Introduction to Software Architecture; Introduction to Design patterns.

Prerequisite*:* 0311205 Object-Oriented Programming

0332402 Requirements Engineering {3} [3-3]

Introduction to requirements engineering: Types of requirements, Specifying and measuring internal and external qualities: performance, reliability, availability, safety, security, etc; Techniques for discovering and eliciting requirements, Analyzing requirements; Requirements specification and system modeling; Requirements validation techniques; Requirements management: Traceability, Handling requirements changes.

Prerequisite*:* 0332401 Introduction to Software Engineering

0332405 Human-Computer Interaction {3} [3-3]

Introduction to Human Computer Interaction; design, implementation and evaluation of interactive computing system for human use; Ergonomics; Components of an interactive system; The Human: Input-output channels, the eye, hearing, touch, smell, taste, movement, memory; The computer: Interacting with

computers, Virtual reality concept, Virtual reality HW/SW, Virtual reality applications; Interaction Design Activities; Universal design principles; Non-traditional interfaces: Haptic user interfaces, Gesture interfaces, Locomotion interfaces, Auditory interfaces, Speech user interfaces, Interactive voice response interfaces, Olfactory interfaces, Taste interfaces, Small-screen interfaces, Multimode interfaces.

Prerequisite*:* 0332401 Introduction to Software Engineering

0332403 Software Construction and Documentation {3} [3-3]

Software construction fundamentals; Managing construction; Agile and Scrum software development; Object Oriented advanced features; Software Documentation: Users need for documentation, Documentation design, Requirements for software documentation; Software construction technologies: Construction for Reuse and with Reuse, API Design, Processes and Threads, Middleware.

Prerequisite*:* 0332401 Introduction to Software Engineering

0332404 Software Construction and documentation Lab {1} [1-2]

Laboratory sessions on the advanced features of Object Oriented using JAVA language: Abstract and Interface classes, Class's relationships, Class's Multiplicity, Inheritance mechanism, Multi Inheritance Implementation, Innerclass, Overriding, and Overloading.

Concurrent*:* 0332403 Software Construction and documentation

0333401 Software Testing and Quality Assurance {3} [3-3]

Software Quality: How to Assure it and Verify it, and the Need for a Culture of Quality; Avoidance of Errors and Other Quality Problems; Inspections and Reviews; Testing; Verification and Validation Techniques; Process Assurance vs. Product Assurance; Quality Process Standards; Product and Process Assurance; Problem Analysis and Reporting; Statistical Approaches to Quality Control.

Prerequisite: 0332401 Introduction to Software Engineering

0333402 Software Testing and Quality Assurance Lab {1} [1-2]

Laboratory sessions on the different concepts of Software Testing and Quality Assurance: Use of Automated Testing Tools; Testing of a Wide Variety of Software; Application of a Wide Variety of Testing Techniques; Inspecting of Software in Teams; Comparison and Analysis of Results.

Concurrent: 0333401 Software Testing and Quality Assurance

0333403 Software Design and Architecture {3} [3-3]

Design Pattern: Creational, Structural, and Behavioral design pattern; Design pattern applications; Software architecture Concepts; Architectural Styles; Service-oriented architectures; middleware architectures; Component-based Development.

Prerequisite*:* 0332403 Software Construction and Documentation

0333404 Software Design and Architecture Lab {1} [1-2]

Laboratory sessions on the different Design Patterns and Architectural Styles: Creational Design Patterns: Factory, Abstract Factory, Builder, Prototype, Singleton; Structural Design Patterns: Composite, Adapter, Decorator, Façade, Bridge; Behavioral Design Patterns: Iterator, State, Observer; Architectural Styles: layers, pipes and filters, blackboard, client-server, three-tiers, broker, peer-to-peer, middleware, Model-View-Controller, Presentation-Abstraction-Control.

Concurrent*:* 0333403 Software Design and Architecture

0334401 Software Project Management {3} [3-3]

The Nature of Information Technology Projects; Project Methodologies and Processes; Measurable Organizational Value and the Business; Project planning: Project infrastructure, Scope and the work breakdown structure, the schedule and budget; Managing Project Risk; Managing Stakeholders and Communication; Managing Project Quality; Leading the Project Team; Managing Organizational Change, Resistance, and Conflict; Project Completion.

Prerequisite: 0332401 Introduction to Software Engineering

0334701 Practical Training {3} [8-Weeks]

This course provides the ability to practice on using computer tools and applications in various fields, either in a public or private sectors under the supervision of the department members. The purpose of the supervised practical training experiences is for students to synthesize the knowledge and skills developed during the academic portion of the program in a practical setting. Practical training is both a learning experience for students and contributes to the work undertaken by the field training site. The expectation is that the practical training will provide learning opportunities unavailable in a classroom setting.

Prerequisite*:* Pass 90 Credit Hours

0334702 Graduation Project

Development of significant software system, employing knowledge gained from courses throughout the program includes: development of requirements, design, implementation, and quality assurance; Students may: follow any suitable process model, must pay attention to quality issues, and must manage the project themselves, follow all appropriate project management techniques; Success of the project is determined in large part by whether students have adequately solved their customer's problem.

Prerequisite*:* Pass 90 Credit Hours

0312201 Visual Programming {3} [3-3]

Visual C#: GUIs design; Control Statements (Selection and Iteration); Data Validation and Error Trapping; Methods; Arrays; File Access; Database Access.

Prerequisite: 0311203 Introduction to programming

0312301 Digital Logic Design {3} [3-3]

Binary Data Representation; Boolean Algebra; Boolean Function Minimization; Combinational Circuits: Adders, Subtractors, Coders, Comparators, Multiplexers, De-multiplexers; Sequential circuits: Flip-Flops, Registers, Counters.

Prerequisite: 0312101 Discrete Mathematics

0312603 Statistics and Probability {3} [3-3]

Sampling; Organizing Data; Descriptive Measures; Probability: Rules of Probability, Bay's Theorem; Counting Rules; Discrete Random Variables; Distributions: Binomial, Hyper-geometric, Poisson, Normal; Confidence Intervals; Regression and Correlation; Applications using Software Packages.

Prerequisite: 0111101 Mathematics (I)

0312604 Numerical Analysis and Programming {3} [3-3]

Error Analysis; Solutions of Equations in One Variable; Interpolation and Polynomial Approximation; Numerical Integration; Numerical Derivation; Direct and iterative Methods for Solving Linear Systems and Applications to Real World Problems; Maple Implementations of Algorithms Studied.

Prerequisite: 0111101 Mathematics (I)

0313101 Algorithms Analysis and Design {3} [3-3]

Algorithm Analysis Techniques; Searching Algorithms; Sorting Algorithms Linear and non-linear; Dynamic Programming; Asymptotic notation; NP-completeness; Graphs Algorithms: Depth First Search, Breath First Search, Minimum Spanning Trees, Kruskal algorithm, Prem's algorithm, and Djikstra algorithm.

Prerequisite*:* 0342102 Data Structures

0313201 Internet Applications Development {3} [3-3]

This course aims to introduce to the students how to build a dynamic, interactive and custom tailored web applications using HTML; Java Programming: SERVLETS, JSPs; SQL Language through JDBC; Advanced Topics: JAVA SESSIONS, JAVA BEANS, COOKIES.

Prerequisite: 0313501 Database Management Systems

0313202 Internet Applications Development Lab {1} [1-2]

The student practices to work under an IDE (Integrated Development Environment) i.e NETBEANS; HTML; Java Programming: SERVLETS, JSPs; SQL Language through JDBC; Advanced Topics: JAVA SESSIONS, JAVA BEANS, COOKIES.

Concurrent: 0313201 Internet Applications Development.

0313303 Computer Organization and Architecture {3} [3-3]

Studying x86 architecture using Assembly Language; Variables and Registers; Arithmetic Instructions; Selection Structures; Iterative Structures; Logic Operations Instructions; Procedures and Macros; Arrays; Strings.

Prerequisite: 0312301 Digital Logic Design

0313501 Database Management Systems {3 } [3-3]

Database Concepts; Database Design Methodologies; Data Modelling using ER and EER; Database Integrity Constraints; Relational Model: Relational algebra, Relational Calculus; Functional Dependencies and Normalization; Structural Query Language (SQL).

Prerequisite: 0311205 Object Oriented Programming

0313203 e-Commerce and Internet Programming {3} [3-3]

Overview of the Microsoft Internet Development Platform; DOT NET Concepts & Visual Studio; Overview of the Basic HTML Notation; Client-Side Scripting Using VBScript (Main Focus) and JavaScript; Server-side Scripting Using ASP.NET: Web Form Concepts, HTML Controls, Web Controls, Validation, and Rich Controls; Database Access Using ADO.NET; Data Binding;

Prerequisite: 0312201 Visual Programming

0313502 Systems Analysis and Design {3} [3-3]

Introduction to systems development; System development life cycle; System Development feasibility; Development of fact finding methods; Context diagram; Data flow diagram; Decision tables and trees; Data dictionary; Installation; Training; Development Tools: Documentation, Maintenance, Conceptual design, DB design, Reverse engineering, Graphical user interface, System conversion, System charts and flow of control.

Prerequisite: 0332401 Introduction to Software Engineering

0313504 Database Applications {3} [3-3]

Database Management Systems Protection and Security Functions; Views; Transaction Management; Concurrency Control and Serialisability; Database Recovery; Database integrity; Rapid Application Development for Database Systems using CASE tools and 4GLs; PL/SQL Programming.

Prerequisite: 0313501 Database Management Systems

0314301 Operating Systems {3} [3-3]

Fundamental Concepts of Operating Systems; Evolution of Operating System; Operating System Structure; Process: Process Management, Inter-process Communication, Process Scheduling, Deadlocks, Process Synchronization; Memory Management; File System Management; I/O Management; Secondary Storage Management; Case Studies.

Prerequisite: 0313303 Computer Organization and Architecture

0342401 Computer Networks {3} [3-3]

Exploring the Network: Uses of Computer Networks, Network Hardware, Reference Model; Physical Layer: Transmission Media, Signaling, Network Topologies; Data Link Layer: Framing, Error Control, Error Detection and Correction, Medium Access Control Layer; Ethernet: Ethernet at the Physical Layer, Ethernet at the Data Link Layer, Ethernet Frame Format, MAC Addressing, CSMA/CD; Network Layer: Layer 3 Addressing, Routing, IP Protocol, NATing; Transport Layer: TCP, UDP, Layer 4 Addressing; Application Layer: HTTP, FTP, SMTP, POP, IMAP, DHCP, DNS.

Prerequisite: 0312301 Digital Logic Design

0342402 Computer Networks Lab {1} [1-2]

Build the Network and Configure Basic Device Settings; Configure Switches with VLANs; Configure Static and Dynamic Routing; Configure a DHCPv4 Server and a DHCP Relay Agent; Configure NATing; Examine the Basic Commands on a PC.

Concurrent: 0342401 Computer Networks

0311603 Linear Algebra {3} [3-3]

Systems of linear equations; Homogeneous and Non Homogeneous systems and solutions; Matrices; Determinants; Vector spaces; Linear Transformations and their properties; Eigenvalues and Eigenvectors; Applications using Software Packages.

Prerequisite: 0111101 Mathematics (I)

0312605 Operations Research {3} [3-3]

Linear Programming; Geometry of Linear Programming Problem; Simplex Method; Duality; Sensitivity Analysis; Transportation and Assignment Problem; Game theory; Applications using Software Packages.

Prerequisite: 0312101 Discrete Mathematics

0313102 Theory of Computation {3} [3-3]

Deterministic and Non-Deterministic Finite Automata; Regular Expressions; Regular Languages; Closure Properties of Regular Languages; Context Free Languages and Grammars; Pushdown Automata; Closure properties of Context Free Languages; Turing Machine.

Prerequisite: 0312101 Discrete Mathematics

0313503 Multimedia information Systems {3} [3-3]

Introduction to the theoretical concepts of digital media; Stages of a multimedia project;

Images; Digital Information Representation, Analog vs Digital Media, Bits Basic Concepts, Digital Images, Bitmap vs Vector; Digital Color Representation; encoding and decoding concepts; different types of digital media compression techniques; file formats; Text; typeface, hypermedia, hypertext, anchors, nodes; Capturing Images by Digital Photography; Digital Video Standards; Shooting and Editing Video.

Prerequisite: 0311203 Introduction to Programming

0314101 Mobile Applications Development {3} [3-3]

Understand Mobile Application Platform; Develop a User Interface Using Certain Types of Controls; Explore User Input, Variables, and Operations; Using Lists, Arrays, and Web Browsers in Mobile Applications; Adding Audio Such as Music; Create Applications that Requests Data, stores it, and then Modifies that Data to Produce a Result Throughout Multiple Activities.

Prerequisite: 0311205 Object Oriented Programming

0314202 Cloud Computing {3} [3-3]

Cloud Computing Technologies: Software as A Service (SaaS), Amazon Elastic Cloud, Microsoft Azure, Google App Engine, And A Few Other Offerings. Cloud Protocols: APIS Used in The Amazon and Microsoft Clouds, Restful Web Services, And Cloud-Based Messaging and Workflow Services to Construct New Applications. Migrate Existing Applications into The Cloud, By Navigating Through Phases Such as Creation of a Private Cloud; Attaching, In A Secure Fashion, The Private Cloud To The Public Cloud; And Provisioning And Maintaining Resources In The Public Cloud.

Prerequisite: 0342401 Computer Networks

0332601 Engineering Economics {3} [3-3]

The scope of engineering economics; Cost Terminology; Cost-Estimation Techniques; The Time Value of Money: Simple interest, compound interest, present and future values of single and annuity cash flows; Evaluating a Single Project: Determining the minimum attractive rate of return (MARR), the present and future worth methods, the annual worth method, the internal rate of return method, the payback (Payout) period method; comparison and selection among alternatives: Basic concepts for comparing alternatives.

Prerequisite: 0332401 Introduction to Software Engineering

0334403 Software Maintenance {3} [3-3]

Maintenance Types; Software Maintenance Process; Cost Estimation; Software Evolution; Reverse Engineering: Program Comprehension, Slicing; Refactoring; Software Metrics for Maintenance; Reuse; Impact Analysis; CASE Tools for Maintenance: Version Control, Building, Testing.

Prerequisite*:* 0332401 Introduction to Software Engineering

0343501 Information Security and Privacy {3} [3-3]

Types of Information Security: Confidentiality, Safety and Availability; Vulnerability Assessment; Monitoring Information Security; Security Threats; Principles of Design, Implementation and Management of Safe Computer Systems; Encryption Algorithms; Firewalls; Security of The Operating System; Control Access to System Resources; Virtual Private Networks (VPN).

Prerequisite: 0342401 Computer Networks

0334408 Selected Topics in Software Engineering {3} [3-3]

The most recent technological topics in software engineering that are not covered in other courses.

Prerequisite*:* 0332403 Software Construction and Documentation