Description of Courses offered by the
Department of Software Engineering .2019/2020

11021101 **General Physics (1) (Prerequisite: - none)** **(3) Cr. Hrs**

Vectors, Basics of Mechanics Description of Motion in one Dimension, Motion in two Dimensions, Applications of   Newton's Laws, Work Energy Theorem, Collisions and Rotational Motion

11031101 **Calculus (1) (Prerequisite:- none)** **(3) Cr. Hrs**

Functions and Limits, Continuous functions, derivative, differentiation rules, implicit differentiation, applications integrals, definite integrals, transcendental functions, inverse trigonometric functions.

06051110 **Programming Methodology (Prerequisite: - none)** **(3) Cr. Hrs**

Problem-solving concepts: constants and variables, data types, problem-solving steps, expressions, problem solving tools, algorithms, flowcharts, pseudo-code, programming logic structures (sequential, decision, and loops), Arrays.

06051200 **Discrete Mathematics (Prerequisite: - none)** **(3) Cr. Hrs**

Introduces discrete structures and techniques for computing. Sets, graphs and trees. Functions, relation properties, recursive definitions, solving recurrences, equivalence, partial order. Proof techniques, inductive proof counting techniques and discrete probability

06051220 **Logic Design (Prerequisite: -** 11021101**)** **(3) Cr. Hrs**

Fundamental concepts of numbering systems, computer codes. Boolean algebra and logic gates. Simplification of Boolean functions, Karnaugh map, combinational logic implementation including PLAs, (adders, comparators, coders, decoders, code converters, multiplexers, de-multiplexers). Sequential circuits, flip flops, counters, shift registers, memories

06051211 **Programming Fundamentals (Prerequisite: -** 06051110**)** **(3) Cr. Hrs**

Fundamental concepts of programming using C++ or Java: classes and objects, modeling object (attributes and behaviors), algorithms, problem solving flowcharts, pseudo codes. Basic blocks of programming such as variable names, data types, control structures, functions, arrays.

06032102 **Data Structures (Prerequisite: -** 06051211**)** **(3) Cr. Hrs**

Introduction to the design and analysis of algorithms, mathematical algorithms. Greedy technique, manipulating data: sorting, searching, dynamic programming, space & time tradeoffs. The concept of algorithm efficiency, table, and information retrieval. Combinatorial problems, advancement in Java skills and techniques

06012232 **Information Systems Analysis & Design (Prerequisite:-**06032112**) (3) Cr. Hrs**

System Theory, information systems and information systems types, system analysis and design methods, object oriented system analysis and design methods. Study cases.

06032112   Object Oriented Paradigm (Prerequisite: - 06051211**)   (3) Cr. Hrs**

Introduction to OOP, models, objects, methods, links, message passing, polymorphism, dynamic binding, classes constructors and destructors, association, generalization and specialization, inheritance, overridden methods, aggregation. Students are required to perform some lab experiments using the latest JAVA language version and UML using Rational Rose software.

06012201   Algorithmic (Prerequisite: - 06032102**)   (3) Cr. Hrs**

Problem solving, Data Structures (static & dynamic), lists, stacks, queues, graphs, trees, sets and dictionaries). Recursion and iteration. Students are expected to do lab experiments using C++ or Java.

06032122   Computer Architecture (Prerequisite: -06051220**)   (3) Cr. Hrs**

Hardware components of a modern computer system, history and performance, the instruction cycle, memory organization, cache memory, I/O organization, CPU, micro-programmed control, instruction formats and modes

06033113   Visual Programming (Prerequisite: - 06032112**)   (3) Cr. Hrs**

Basic Visual Programming, solid foundation of the syntax and semantics of a visual Programming language used to develop both windows-based and web-based application. Coverage of Microsoft's. NET platform architecture.

06013214   Web Design (1) (Prerequisite: - 06032112**)   (3) Cr. Hrs**

Basic concepts of the Internet and Internet browsers, Internet applications, web page creation tools and languages. Basic XHTML (frames, forms), cascading style sheets, scripting and scripting languages. Dynamic XHTML (object based programming and events). Students are required to do a Mini- project.

06014115   Web Design (2) (Prerequisite: -06013214**)   (3) Cr. Hrs**

This unit introduces students to design, development and implementation of server side applications, the use of multimedia and human interaction on the browser side. Students gain practical experience creating dynamic web applications that interact with a database using client side scripts, server side scripts and compiled server programs. Security, access right, financial transactions and legal issues are also covered. This unit incorporates substantial practical experience in applying theoretical concepts. Students are required to submit mini project.

06013130   Databases (Prerequisite: - 06012201**)   (3) Cr. Hrs**

An in-depth examination of relational databases, modern database technologies, conceptual design and entity relationship modeling, relational algebra and calculus, data definition and manipulation languages using SQL, schema and view management, query processing and optimization, transaction management, security, privacy, integrity, and management. Students are required to do project work.

06083223   **Operating System (Prerequisite: -** 06032122**)**   **(3) Cr. Hrs**

Definition of operating system, review of hardware, software and firmware, process concepts, asynchronous concurrent processes, real storage, virtual storage, processor scheduling, distributed computing, disk performance optimization.

06033260   **Software Engineering Tools (Prerequisite: -** 06032250**)**   **(3) Cr. Hrs**

CASE definition. Building blocks of CASE. A taxonomy of CASE tools, Rational Unified Process (RUP), Unified Modeling Language(UML), project management tools, analysis and design tools. Programming tools, integration and testing tools, prototyping tools. Maintenance tools, framework tools. CASE and AI, integrated CASE environments

06033151   **Requirements Engineering (Prerequisite: -**06032250**)**   **(3) Cr. Hrs**

The main objective of this course is to provide students with a broad perspective on requirements engineering process. By improving these processes, students will create descriptions of system and user requirements which are easier to understand, complete and testable. Students will also have more effective procedures for managing changes to these requirements and assessing the impact and cost of these changes.

06033254   **Web Engineering (Prerequisite: -**06032250**)**   **(3) Cr. Hrs**

A study of the concepts, principles, techniques, and methods of Web engineering. Topics include requirements engineering, modeling and architectures, design and technologies, testing, operation and maintenance, Web project management, application development process, usability and performance, and security of Web applications. Technologies (particularly on Web 2.0), business models and strategies, and societal issues of Web 2.0 and Semantic Web are also discussed.

06033252   **Software Design (Prerequisite: -**06033151**)**   **(3) Cr. Hrs**

The course covers elementary methods for developing robust, efficient, and re-usable software. Specific topics include memory management and the pragmatic aspects of implementing data structures such as lists and hash tables. Debugging tools and techniques are discussed and common programming errors are considered along with defensive programming techniques to avoid such errors. Testing regimes, such as regression testing are introduced. The course is taught from a practical engineering viewpoint and it includes a considerable amount of

programming practice, using existing tools as building blocks to complete a large-scale task.

06034157   **Software Testing**   **(Prerequisite: -**06033253**)**   **(3) Cr. Hrs**

Role of verification and validation in the system life cycle. Verification and validation planning. Requirements oriented testing, test plan design, effective testing techniques, symbolic execution. Model checking, debugging, Critical system validation.

06034156   **Software Documentation**   **(Prerequisite: -** 06033252**)**   **(3) Cr. Hrs**

Documentation life cycle: analysis, design, productions usability testing and fulfillment. Users: customers, managers, system engineers, system maintenance engineers. Structure: traditional and IEEE. Documentation enhancements: audit, form and questionnaire design, embedded indexing, legacy documentation and metrics.

06033253   **Object Oriented Software Engineering**
   (Prerequisite: - 06033151**)**   **(3) Cr. Hrs**

The object-oriented paradigm in software engineering context, Object-oriented concepts, Object-oriented design methods, Design by contract for software reliability and extendibility, Software design for a medium-size software product, Software design and evaluation for reuse and the use of design patterns, Object-oriented testing: incremental system development with process and product metrics, Using CASE tools for rapid object-oriented design and implementation.

06034154   **Web Design**   **(Prerequisite: -**06032250**)**   **(3) Cr. Hrs**

This unit introduces students to design, development and implementation of server side applications, the use of multimedia and human interaction on the browser side. Students gain practical experience creating dynamic web applications that interact with a database using client side scripts, server side scripts and compiled server programs. Security, access right, financial transactions and legal issues are also covered. This unit incorporates substantial practical experience in applying theoretical concepts. Students are required to submit mini project.

06034190   **SE -Practical Training**   **(Prerequisite: -** Pass 90 Cr.hr.**)**   **(3) Cr. Hrs**

Practical training in the public or private sector for at least 8 weeks

06034155   **Software Quality Assurance**   **(Prerequisite: -** 06033252**)**   **(3) Cr. Hrs**

Software quality, SQ factors, components of SQA system. Development and quality plans, quality activities in the project life cycle, reviews, procedures and work instructions. Documentation control, software quality metrics.

06034258 **Software Maintenance and Reverse Engineering** **(3) Cr. Hrs**
(Prerequisite: -06034157**)**

The course addresses the knowledge and techniques necessary to enhance, perfect and modify software overtime. It covers the issues of software maintenance, extensibility, and software adaptability to different environments, as well as, software reverse engineering process, such as reverse engineering and restructuring, how legacy systems can be assessed to decide if they should be scrapped, maintained, re-engineered or replaced. Finally the destruction between Software reverse engineering and data re- engineering is demonstrated.

06082140 **Computer Networks** **(Prerequisite**: - 06051220) **(3) Cr. Hrs**

Introduction to logical and physical of computer networks, architecture and transmission alternatives. OSI-reference model, ALOHA protocol, CSMA protocols, LAN, IEEE standards and protocols (token ring, token bus and Ethernet), physical layer basics, data link layer, framing protocols, error detecting and correcting, routing algorithms, flow control, congestion control algorithms, personal computer networks.

06034259 **Software Projects Management (Prerequisite: -** 06032250) **(3) Cr. Hrs**

Management activities, project planning and scheduling. Risk management, managing people. Software cost estimation, quality management, software measurement and metrics. Process improvement, configuration management.

06034291 **Graduation Project for SE** **(Prerequisite:-**Pass 90 Cr.hr.**)** **(3) Cr. Hrs**

Student picks one of the projects posted by the department as part of requirements of graduation.

06013231 **Database Management Systems (Prerequisite: -** 06013130) **(3) Cr. Hrs**

Application development, integrated application, XML standards distributed database processing and view support. Data protection problems, recovery, concurrency, security and data integrity. Database administration and tuning, all practical applications shall be implemented in ORACLE.

11031230 **Statistics and Probabilities** **(Prerequisite: -** 11031101) **(3) Cr. Hrs**

Definitions and basic elements of probability, Rules of probability, Random Variables: Discrete and continuous random variables and their probability distribution functions, the mathematical expectation. Some discrete and continues distributions: Binomal, Poisson, geometric, Hyper geometric and Normal Distributions. Point and interval estimation of the parameters of one and two populations. Tests of hypotheses concerning the above parameters, and Goodness of fit and independence tests. Simple linear Regression and inference concerning its parameters multiple linear regression: Description and estimate using matrices.

06032250   **Software Engineering Fundamental (Prerequisite: -** 06032112**)**   **(3) Cr. Hrs**

This course provides an overview of engineering as a discipline; the course introduces student to the fundamental principles, models and methodologies of a software engineering. It covers basic knowledge about software processes. It provides minimum prerequisite knowledge for more detailed and specialized study of software engineering. Students gain experience, via a team project, about life-cycle development of software systems.

06043273   **Advanced Programming (Prerequisite: -** 06033113**)**   **(3) Cr. Hrs**

Advanced features of the language such as handling exceptions, Files and Database connectivity. Other major topics in this course include network programming serialization, properties, multithreading, and security.

06042150   **Information Security (Prerequisite: -** 11031230**)**   **(3) Cr. Hrs**

Information security basics, basic cryptography, modern symmetric ciphers, public key cryptosystems, key management, message authentication, hash functions, digital signatures, IP and web security, firewalls and trusted systems, secured software design, application security software threats, social, legal, and ethical issues. Human factors in security.

06033274   **Human Computer Interaction (Prerequisite: -** 06033113**)**   **(3) Cr. Hrs**

Tools and techniques for designing, implementation, deploying and evaluation of user interfaces. Interactive systems; dialogue styles, theories of interaction and component integration, human-computer interaction frameworks.

06052253   **Numerical Analysis**   **(Prerequisite: -** 11031101**)**   **(3) Cr. Hrs**

The error calculation, roots of nonlinear equations, use of numerical methods to solve systems of linear equations, approximation Functions, Find derivatives, find the values of numerical integrals by numerical methods, the use of numerical methods to solve differential equations

06033172   **Programming Mathematics (Prerequisite: -**06032112**)**   **(3) Cr. Hrs**

Introduction to MATLAB infrastructure. Working with linear algebra, arrays and matrices. Graphics: plotting, images and GUI. Use of symbolic Math toolbox: flow control, data structures, scripts, functions and calculus. Solving equations.

06022173   **Multimedia Systems (Prerequisite: -** None**)**   **(3) Cr. Hrs**

Introduction to the study and creation of multimedia, using various software programs. Students will learn both the aesthetic and technical aspects of multimedia design and production. Students will be introduced to Web production and the business process behind multimedia, working in teams to produce a Web-based product for real business clients. Students will use software programs such as Macromedia Dreamweaver, Flash, Director, and Adobe Photoshop.

06013256   **Smart Phone Programming (Prerequisite: -** 06033113**)**   **(3) Cr. Hrs**

The smart phone programming course allows students to learn the fundamentals of programming for smart phones. It covers various concepts related to layouts, widgets event handling, processing JSON files, using MySQL database with php service. The course allows students to be familiar with a mainstream of today's technology

06013176   **Artificial intelligence (Prerequisite: -**06012201**)**

Introduction to artificial Intelligence, symbolic reasoning and knowledge representation techniques, control strategies, heuristic search, and AI applications (expert systems, neural language processing, robotics…etc.). Introduction to neural networks, genetic algorithm and machine learning.

06014155   **Distributed Systems(Prerequisite: -**06013130**)**

Characterization of distributed systems, system models, network and internetworking. Intercrosses communication, distributed objects and remote invocation, operating system support, distributed file systems. Name services, peer-to peer systems, time and global states, coordination and agreement, concurrency control, replication, CORBA.

06014157   **Electronic Transactions (Prerequisite: -**06013214**)**

This Unit is aimed at providing the students with the basic concepts and strategies of electronic commerce and electronic government, as well as current applications, opportunities, threats, and social implications. The unit is specifically focused on delivering material to address issues in current technologies and trends enabling e-commerce and e-government. It also covers security and legal issues. And discuss the future of e-commerce and e-government.

06034280   **Software Fault Tolerance**   **(Prerequisite: -** 06033252**)**

Introduction to Software Design Faults, Software Reliability Metrics, Single-Version Software Fault Tolerance Techniques, Multi-Version Software Fault Tolerance Techniques, Fault Tolerance in Operating Systems, Computer Fault Tolerance.

06014171   **Special Topics (1) (Prerequisite: -** Dept. Approval**)**   **(3) Cr. Hrs**

To be set by the department.

06014272   **Special Topics (2) (Prerequisite: -** Dept. Approval **)**   **(3) Cr. Hrs**

To be set by the department.