

Glossary

Algorithms and Complexity – Computational solutions (algorithms) to problems; time and space complexity with respect to the relationship between the run time and input and the relationship between memory usage and input as the size of the input grows.

Analysis of Business Requirements – The process through which an information systems or software application development project determines the optimal capabilities of the target system or application based on the business goals of the individual user(s) or the user organization(s).

Analysis of Technical Requirements – The process through which a computing development project determines the computing and communications hardware and software based on the goals of the individual user(s) or the user organization(s).

Business Models – Various structures, processes, and other mechanisms that businesses and other organizations use for organizing the way they interact with their primary external stakeholders (e.g., customers and suppliers) to achieve their primary goal (e.g., maximization of profit).

Circuits and Systems – The computing and communications hardware and software components that constitute a computing project or solution.

Computer Architecture and Organization – Form, function, and internal organization of the integrated components of digital computers (including processors, registers, memory, and input/output devices) and their associated assembly language instructions sets.

Computer Systems Engineering – A computing discipline that is more prominent in Europe than in North America. It integrates aspects of CE, CS, and SE, and focuses on the development of complex systems that require close integration of computer hardware and software. Areas of special emphasis include design and implementation of embedded and real-time systems, the use of formal methods for specification of computer systems, and the implementation of systems on specialized-purpose circuits.

Decision Theory – A field of study that develops knowledge and analytical models that together will help decision makers select among various alternatives that are known (or thought) to lead to specific consequences.

Digital logic – Sequential and non-sequential logic as applied to computer hardware including circuits and basic computer organization.

Digital Media Development – The field of computing that deals with the portable storage of digital information.

Digital Signal Processing – The field of computing that deals with digital filters, time and frequency transforms, and other digital methods of handling analog signals.

Distributed Systems – Theory and application of multiple, independent, and cooperating computer systems.

E-business – The use of information and communication technology solutions to implement business models and internal and external business processes. In a more narrow sense, the term is often used to refer to the use of Internet technologies to conduct business between firms (B2B), between firms and consumers (B2C), or among consumers (C2C).

Electronics – The hardware that constitutes the computing and communications circuits which either directly operate on electronic signals or run the software which operates on electronic signals. The fields of computing and communications presently rely completely on electronics.

Embedded Systems - Hardware and software which forms a component of some larger system and which may be expected to function with minimal human intervention (e.g., an automobile's cruise control system).

Engineering Economics for SW – Cost models for the software engineering lifecycle including development, maintenance, and retirement of software systems.

Engineering Foundations for SW – Engineering design, process, and measurement as applied to software systems.

Evaluation of Business Performance – The activities that an organization uses to determine how successful it has been in achieving its goals.

Functional Business Areas – Accounting, finance, marketing, human resource management, manufacturing, and logistics are examples of functional business areas. Each of these is responsible for a set of connected business activities which as a whole help a business achieve a specific functional goal (such as providing a reliable and appropriate set of internal and external business performance measures in accounting).

General Systems Theory – A field of study that explores the general characteristics of systems in various areas of human behavior and natural sciences with a special focus on complexity and system component interdependency. General systems theory had its origins in physics, biology, and engineering, but it has been utilized in many other fields such as economics, organizational theory, philosophy, sociology, and information systems.

Graphics and Visualization – Theory and application of computer generated graphics and graphical representation of data and information including static, dynamic, and animated techniques.

Hardware Testing and Fault Tolerance – The field of study that deals with faster, cheaper, and more efficient ways of testing hardware (see also **Electronics** and **Circuits and Systems**) as well as ways of making hardware more fault tolerant (able to continue functioning as specified in spite of hardware or software faults).

Human-Computer Interaction – An organizational practice and academic field of study that focuses on the processes, methods, and tools that are used for designing and implementing the interaction between information technology solutions and their users.

Information Management (DB) Theory – Theoretical models for information representation, storage, and processing.

Information Management (DB) Practice – The activities associated with the analysis, design, implementation, and management of organizational information resources such as operational databases, data warehouses, and knowledge management systems.

Information Systems Development – The human activities -- including requirements analysis, logical and physical design, and system implementation -- that together lead to the creation of new information systems solutions.

Integrative Programming – Uses the fundamentals of programming to focus on bringing together disparate hardware and software systems, building a system with them that smoothly accomplishes more than the separate systems can accomplish.

Intelligent Systems (AI) – Computer applications that are based on artificial intelligence theory and techniques including rule-based systems, genetic and evolutionary computation, and self-organizing systems.

Interpersonal Communication – An area of study that helps computing students improve their oral and written communication skills for teamwork, presentations, interaction with clients and other informants, documentation, sales and marketing activities, etc.

Legal / Professional / Ethics / Society – The areas of practice and study within the computing disciplines that help computing professionals make ethically informed decisions that are within the boundaries of relevant legal systems and professional codes of conduct.

Management of Information Systems Organization – The processes and structures that are used to organize and manage the employees and contractors within the organization whose primary organizational role is to create, maintain, administer, or manage organizational information systems solutions.

Mathematical Foundations – Those aspects of mathematics that underlie work in the computing disciplines. The subsets of mathematics that are most relevant to computing vary from one computing discipline to another. Depending on the discipline, mathematical foundations may include algebra (linear and abstract), calculus, combinatorics, probability, and/or statistics. The term "mathematical foundations" sometimes also includes the fields of study and research that are interdisciplinary between mathematics and computer science such as discrete mathematics, graph theory, and computational complexity theory.

Net Centric: Principles and Design – Includes a range of topics including computer communication network concepts and protocols, multimedia systems, Web standards and technologies, network security, wireless and mobile computing, and distributed systems.

Net Centric: Use and Configuration – The organizational activities associated with the selection, procurement, implementation, configuration, and management of networking technologies.

Operating Systems Principles & Design – Underlying principles and design for the system software that manages all hardware resources (including the processor, memory, external storage, and input/output devices) and provides the interface between application software and the bare machine.

Operating Systems Configuration & Use – Installation, configuration, and management of the operating system on one or more computers.

Organizational Behavior – A field of study within the business discipline of management that focuses on individual and group-level human behavior in organizations. The core topics include, for example, individual and group decision making, problem solving, training, incentive structures, and goal setting.

Organizational Change Management – A field of study often associated with the business discipline of management that focuses on topics that help employees in organizations to manage and cope with organizational change whether it is a result of internal organizational actions or forces in the external environment.

Organizational Theory – A field of study within the business discipline of management that focuses on the structure of the organizations. This field helps managers decide what types of organizational structures to use and understand why certain types of structures tend to work better than others. Key questions focus on centralization/decentralization of power, the selection and use of coordination and control mechanisms, and breadth and dept of the organizational reporting structures.

Platform Technologies – The field of study which deals with the computing hardware and operating systems which underlie all application programs.

Programming Fundamentals - Fundamental concepts of procedural programming (including data types, control structures, functions, arrays, files, and the mechanics of running, testing, and debugging) and object-oriented programming (including objects, classes, inheritance, and polymorphism).

Project Management – An organizational practice and academic field of study that focuses on the management approaches, organizational structures and processes, and tools and technologies that together lead to the best possible outcomes in work that has been organized as a project.

Risk Management (Project, safety risk) – An organizational practice and academic field of study that focuses on the processes, management approaches, and technologies for identifying risks, determining their severity level, and choosing and implementing the proper course of action for each risk.

Scientific Computing (Numerical Methods) – Algorithms and the associated methods for computing discrete approximations used to solving problems involving continuous mathematics.

Security: Issues and Principles – Theory and application of access control to computer systems and the information contained therein.

Security: Implementation and Management – The organizational activities associated with the selection, procurement, implementation, configuration, and management of security processes and technologies for IT infrastructure and applications.

Software Design - An activity that translates the requirements model into a more detailed model that represents a software solution which typically includes architectural design specifications and detailed design specifications. [Alternatively, in software engineering, the process of defining the software architecture (structure), components, modules, interfaces, test approach, and data for a software system to satisfy specified requirements. [ANSI/IEEE Standard 729-1983]]

Software Evolution (Maintenance) - (1) The process of modifying a software system or component after delivery to correct faults, improve performance or other attributes, or adapt to a changed environment. (2) The process of retaining a hardware system or component in, or restoring it to, a state in which it can perform its required functions. [IEEE Std 610.12-1990]

Software Modeling and Analysis – An activity that attempts to model customer requirements and constraints with the objective of understanding what the customer actually needs and thus defining the actual problem to be solved with software.

Software Process - (1) A sequence of steps performed for a given purpose, for example, the software development process. (2) An executable unit managed by an operating system scheduler. (3) To perform operations on data. [IEEE Std 610.12-1990]

Software Quality (Analysis) - (1) A planned and systematic pattern of all actions necessary to provide adequate confidence that an item or product conforms to established technical requirements. (2) A set of

activities designed to evaluate the process by which products are developed or manufactured. [IEEE Std 610.12-1990]

Software Verification and Validation - The process of determining whether the requirements for a system or component are complete and correct, the products of each development phase fulfill the requirements or conditions imposed by the previous phase, and the final system or component complies with specified requirements. [IEEE Std 610.12-1990]

Systems Administration – The field of study which deals with the management of computing and communications resources, including networks, databases, operating systems, applications, and Web delivery. The management issues include installation, configuration, operation, and maintenance.

Systems Integration – The field of study that deals with the incorporation of computing and communications resources to create systems that meet specific needs. Elements include organizational issues, requirements, system architecture, acquisition issues, testing, and quality assurance.

Technical Support – The field of study which deals with solving the problems of the end user of a computing and/or communications product or system after the product or system has been delivered and installed.

Theory of Programming Languages – Principles and design of programming languages including grammars (syntax), semantics, type systems, and various language models (e.g., declarative, functional, procedural, and object-oriented).

VLSI Design – The field of study that deals with creating *electronic* solutions to computing and communications problems or needs. This includes custom integrated circuit (IC) design (which includes microprocessors and microcontrollers), application-specific IC design (including standard cells and gate arrays), and programmable hardware (including FPGAs, PGAs, PALs, GALs, etc.).