

**COMPUTER SCIENCE/INFORMATION SYSTEMS DEGREE PLAN**

YEAR 1, SEMESTER 1		
CODES	COURSE TITLE	UNITS
	Composition I	3
	Calculus I	5
	Humanistic (Religion)	3
	Total Wellness	2
COMP1401	Computer Programming	4
Total		17

YEAR 1, SEMESTER 2		
CODES	COURSE TITLE	UNITS
	Composition II	3
	Calculus II	5
	Physics I	5
	Statistics	3
COMP1402	Object Oriented Programming	4
Total		20

YEAR 2, SEMESTER 3		
CODES	COURSE TITLE	UNITS
	Public Speaking	3
	Linear Algebra	3
	Physics II	5
	Principles of Macroeconomics	3
COMP2301	Discrete Mathematics	3
COMP2302	Digital Systems	3
Total		20

YEAR 2, SEMESTER 4		
CODES	COURSE TITLE	UNITS
	Intro to Literature	3
	General Psychology	3
	Intro to Environmental Science	3
COMP2404	Data Structure	4
COMP2303	Computer Organization & Architecture	3
COMP2305	Operating Systems	3
Total		19

YEAR 3, SEMESTER 5		
CODES	COURSE TITLE	UNITS
COMP3306	Human Computer Interaction	3
COMP3303	Computer Networks	3
COMP3402	Database Management System	3
COMP3301	Design & Analysis of Algorithm	3
COMP3304	Software Engineering	3
COMP3305	Web Programming	3
Total		18

YEAR 3, SEMESTER 6		
CODES	COURSE TITLE	UNITS
COMP3308	Information Security	3
	Information Theory	3
	Numerical Methods	3
COMP3309	Artificial Intelligence	3
	Research Methods	3
	CS Elective I	3
Total		18

YEAR 4, SEMESTER 7		
CODES	COURSE TITLE	UNITS
	Bahasa Indonesia	3
COMP4301	Automata Theory	3
	CS Elective II	3
	CS Elective III	3
COMP4304	CS Seminar	3
	Final Project I	3
Total		18

YEAR 4, SEMESTER 8		
CODES	COURSE TITLE	UNITS
	Pancasila	3
	Elective I	3
	Elective II	3
	Final Project II	3
	Internship	3
Total		15

Total Credit Hours for Computer Science/Information Systems: 145 hours.

## **COURSE DESCRIPTIONS**

The course descriptions below are for Computer Science and Information Systems courses only. For General Education courses, please refer to SUAC course descriptions.

- **Computer Programming (COMP1401 - 4 credits)**  
This course introduces students to the fundamentals of procedural programming languages via practical exposure to the C programming language. Topics for this course will include, but are not limited to, procedural programming languages, elementary data structures, file handling and pointers. Emphasis will be placed on both the theoretical and practical aspects of computer programming.  
Pre-requisite: -
- **Object Oriented Programming (COMP1402 - 4 credits)**  
This course introduces students to the fundamentals of object-oriented programming languages via practical exposure to the Java programming language. Topics for this course will include an introduction to Java, fundamental programming structures, graphical user interfaces, Unified Modelling Language (UML). Emphasis will be placed on both the practical and theoretical aspects of object-oriented programming.  
Pre-requisite: COMP1401
- **Discrete Mathematics (COMP2301 – 3 credits)**  
This course is introductory in discrete mathematics, the study of mathematical structures (objects) which are discrete. It is an important area of mathematics which provides the mathematical basis for the understanding of computers and modern computation. The course has applications to almost every conceivable area of study such as computer science, data networking, chemistry, biology, linguistics, geography, business, and the internet. This course introduce students the strategy and methods in proof, construct algorithm and apply various methods of counting principles in real life.  
Pre-requisite: -
- **Digital Systems (COMP2302 - 3 credits)**  
This course is designed to introduce students to applied logic which in turn, introduces them to the basics of the electronics of digital systems. Students will learn how logic circuits are formed from the most basic components. They will also gain an understanding of how these basic components are combined to form larger systems. Topics in this unit include, but are not limited to: Number Systems, Logic Gates, Boolean algebra, Arithmetic Operations, Logic Families, Counters, Registers, Microprocessor Basics and an Introduction to Microcontrollers.  
Pre/co-requisite: COMP2301
- **Computer Organization & Architecture (COMP2303 - 3 credits)**

This course introduces the students to computer architecture starting from top-level view of computer system and then taking closer view of the basic hardware components to construct more sophisticated circuits, which are then converted into memory units, processor units as well as a whole computer systems. Topics will include: overview of number systems and representation, computer arithmetic, the CPU, registers, bus architectures, instruction types, micro operations, memory hierarchy, virtual memory, auxiliary memory, I/O peripheral devices and communication interfaces.

Pre-requisite: COMP2302

- Data Structures (COMP2404 - 4 credits)

This course introduces a variety of data structures and their algorithmic. The course teaches students how to choose appropriate data structures and which type of algorithm is most likely to achieve a correct solution in the most efficient way. Topics will include arrays, lists, trees, hashing, sorting and heaps. There will also be a cursory introduction to the fields of complexity theory, analysis and the notion of NP-completeness.

Pre-requisite: COMP1401

- Operating Systems (COMP2305 - 3 credits)

This course introduces the students to a wider range of operating systems (OS) and their implementation details. Topics in this course include: OS Architecture, OS Basics, OS Internals, Underneath the Framework, Resource Management, OS Security, and Mobile OS.

Pre/co-requisite: COMP2303

- Design and Analysis of Algorithm (COMP3301 – 3 credits)

This course teaches students how to effectively design algorithms using a number of design paradigms. There is a more in-depth focus on the analysis of algorithms and the concept of computability. The students will be introduced to basic algorithm design paradigms such as divide and conquer, dynamic programming, branch and bound, recursion, brute force and greedy algorithms. Other topics include P vs. NP, Computability, Turing Machines, and Complexity Theory.

Pre-requisite: COMP2404

- Database Management System (COMP3402 - 4 credits)

This course introduces database management systems, relational databases and object oriented databases. It covers relational algebra, SQL, store procedures, user-defined functions, cursors, an embedded SQL program, client-server interfaces, entity relationship diagrams, normalization, concurrency, transactions, database security, constraints and object-relational databases.

Pre-requisite: COMP2404

- Computer Networks (COMP3303 - 3 credits)

The main aim of the course is to expose the students to fundamental concepts in the design and implementation of computer communication and networking in wired and wireless settings. Topics will include goals and applications of networks, network structure and architecture, network topology design, network switching methods, medium access sub layer, error handling, network layer, routing, transport layer, connection management, session layer, application layer.

Pre-requisite: -

- Software Engineering (COMP3304 - 3 credits)

This course gives a comprehensive analysis of software engineering techniques and its applications. Software engineering is a critically important technology for the future of mankind. Software engineers will need to develop this discipline so that they can create more complex software systems. Topics in this course include: Introduction to Software Engineering; Software Process Models; Project Management and Requirement Engineering; System Modelling and Prototyping; Design Engineering; Verification and validation.

Pre-requisite: COMP1402

- Web Programming (COMP3305 – 3 credits)

This course introduces students to exchanging information over the Internet, Web Technologies for Supporting Remote Clients, Application Servers, and Web Technologies for Application Integration.

Pre/co-requisite: COMP1402, COMP3402

- Human Computer Interaction (COMP3306 – 3 credits)

In this course students will be introduced to the fundamentals of human computer interaction, user interface design and usability analysis. Students will learn the importance of good interfaces and the relationship of interface design to effective human interaction with computers. The course covers fundamental theory and practice of the design, implementation and evaluation of human computer interfaces.

Pre-requisite: -

- Information Theory (COMP3307 - 3 credits)

This course introduces the basics of information theory. Topics of this course include entropy, mutual information, data compression, Huffman coding, universal source coding, channel coding, error-correcting, and basic cryptology.

Pre-requisite: COMP2301, Statistics

- Principles of Information Security (COMP3308 - 3 credits)

The course will introduce principle concepts in the field of information and computer security. Topics include information security basics – classification of attacks, damage assessment, information classification; information security attacks – threats, software attacks, malicious code, spam, human error; legal, ethical and professional issues –

international law and standards, codes of ethics for professional organizations; application / software related security - malware, antivirus software; telecommunication and Internet security – packet filtering, firewalls, gateways and virtual private networks.

Pre-requisite: -

- Artificial Intelligence (COMP3309 - 3 credits)

This course will introduce students to the basic concepts of Artificial Intelligence (AI) and the major areas of applications of AI. To achieve further involvement in the field of AI, students will be introduced to logic programming and will be given assignments to develop small application of AI. At the end of the course students will be able to identify the potential areas of application of AI in the real world and confidently engage in developing a solution based on AI.

Pre-requisite: COMP3301, Statistics, Linear Algebra, Calculus 1

- Computer System Administrator (COMP3310 - 3 credits)

In this course, students will be exposed to roles of a system administrator, UNIX commands, controlling processes, common file system directories, user maintenance, special devices, drivers and the kernel, TCP/IP networking, and routing concepts. The course also covers the esoteric and subtle differences between different variant of Unices.

Pre-requisite: COMP2305, COMP3303

- Automata Theory (COMP4301 - 3 credits)

This course provides an introduction to the theoretical foundations of computer science. The course discusses different models of computation and their limitations. Among the topics covered are: formal grammars, finite-state automata, push-down automata, and Turing machines.

Pre-requisite: COMP2301, COMP3301

- Machine Learning (COMP4302 - 3 credits)

In this course students will be introduced to the fundamentals of paradigms and techniques in machine learning. The course covers introduction to machine learning, including supervised and unsupervised learning algorithms, reinforcement learning and an introduction to deep learning architectures.

Pre/co-requisite: COMP3309

- Mobile Apps Development (COMP4303 – 3 credits)

This course introduces students to the several approaches in mobile programming. Students will learn to develop mobile applications (Apps) to solve problems efficiently.

Pre-requisite: COMP1402

- Research Methods

Introduction to research processes, including formulation of research problem, research design, sampling and measurement methods, research proposal writing, literature review, data collection, data processing, and reporting.

Pre-requisite: Statistics

- CS Seminar (COMP4304 - 3 credits)

This seminar course gives students exposure to a variety of computer science topics as presented by the instructor and several (guest) lecturers. In addition, students have the opportunity to present their own preliminary research on several subjects of interest. The course is recommended for students nearing completion of their undergraduate degree in the subject of computer science.

Pre/co-requisite: Research Methods

- Internship

Internship is a formal apprenticeship, work-based training, temporary employment or other form of a guided professional experience that a student undertakes externally at an organization or under the auspices of a professional or practitioner. The Internship is conducted within the final two years of a study program. The Internship is a component of the professional development curriculum and is an opportunity for students to apply their classroom-attained knowledge in a real-life situation. It consists of supervised work-experience in an external company, organization, or institution.