

AL Buraimi University College



كلية البريمي الجامعية

**Department of Information Technology**

**Computer Science Program**

**Revised May, 2019**

# Computer Science Program

## Vision

The Computer Science program prepares graduates who are globally recognized as innovative and well-prepared computing professionals.

## Mission

Computer science program provides and equips students with all the knowledge and skills in program system design, maintenance, development, and the latest technologies in computer science. This program prepares graduates with all that is required for successful careers such as program engineers, system analysts, graphic specialists, network specialists. Our graduates will find job opportunities in both government and private sector firms.

## Program Objectives

1. Our graduates acquire knowledge of computer science principles, computer hardware and mathematics appropriate to the discipline.
2. Our graduates demonstrate knowledge of computing practices in industry and emerging technologies.
3. Our graduates apply networking concepts to solve organizational problems.
4. Our graduates analyze problems and determine the computing requirements appropriate to meet desired needs.
5. Our graduates develop software's by using different principles and practices of software design and development.
6. Our graduates show awareness of social and work ethics.
7. Our graduates show good command of language in general and specific contexts relating to the discipline.

# **Structure of the Computer Science Study Plan**

## **Diploma in Computer Science (2 years)**

Number of credit hours required for obtaining a Diploma in Computer Science is 66 hours on intense study. The freshman year program includes courses in mathematical analysis, algorithms and programming, computer architecture and assembly language, symbolic logic, and data structures and program design. Sophomores take courses in linear algebra, computer organization, programming language concepts, files and data bases, and fundamental mathematical concepts.

## **Advanced Diploma in Computer Science (3 years)**

Number of credit hours required for obtaining a Diploma in Computer Science is 96 hours on intense study. As juniors, students take courses in combinatorial algorithms; automata, languages, and computation; operating systems and system architecture; and program design techniques, along with a course in either probability or statistics.

## **Bachelor Degree in Computer Science (4 years)**

Number of credit hours required for obtaining a Diploma in Computer Science is 126 hours on intense study. The undergraduate program, leading to a B.S. in computer science, provides a broad knowledge of computing. It consists of core courses in programming languages, computer system organization and operating systems, data structures, computation theory, computer logic, and societal implications in computing.

## **Job Opportunities**

Graduates of the IT department, CS program are expected to have the following jobs after graduation:

1. Network Engineer
2. Systems Engineer
3. Software Engineer
4. Systems Analyst
5. Systems Designer
6. Computer Programmer
7. Technical support Engineer

## Bachelor Degree (126 Credits)

### College General Requirements (Compulsory) 21 Cr

| SN           | Course Number | Course Title                    | Credit Hours | Prerequisite |
|--------------|---------------|---------------------------------|--------------|--------------|
| 1            | BCGE001       | Arabic Language                 | 3            | None         |
| 2            | BCGE002       | Islamic Culture                 | 3            | None         |
| 3            | BCGE003       | Omani Society                   | 3            | None         |
| 4            | COMP100       | Computers: Their Impact and use | 3            | None         |
| 5            | ENGL002       | General English                 | 3            | None         |
| 6            | BCGE004       | Study Skills                    | 3            | None         |
| 7            | BCGE009       | Entrepreneurship                | 3            | None         |
| 8            | IC3           | IC3                             | 0            | None         |
| <b>Total</b> |               |                                 | <b>21</b>    |              |

### Department Requirements (Compulsory) 27 Cr

| SN           | Course Number | Course Title                              | Credit Hours | Prerequisite        |
|--------------|---------------|---|--------------|---------------------|
| 1            | COMP112       | Algorithms and Programming (1)            | 3            | None                |
| 2            | COMP113       | Algorithms and Programming (2)            | 3            | Comp112             |
| 3            | MATH152       | Mathematical Analysis (1)                 | 3            | None                |
| 4            | ENGL004       | Technical Writing (1)                     | 3            | ENGL002             |
| 5            | ENGL030       | Technical Writing (2)                     | 3            | ENGL004             |
| 6            | COMP182       | Data Structure and Program Design         | 3            | COMP113             |
| 7            | COMP123       | Computer Architecture & Assembly Language | 3            | COMP112             |
| 8            | COMP490       | Senior Project                            | 3            | Department Approval |
| 9            | COMP 241      | Introduction to Database                  | 3            | IS431               |
| <b>Total</b> |               |   | <b>27</b>    |                     |

### Major Requirements (Compulsory) 69 Cr

| SN | Course Number | Course Title                | Credit Hours | Prerequisite |
|----|---------------|-----------------------------|--------------|--------------|
| 1  | SOM120        | Basic Business Statistics   | 3            | MATH152      |
| 2  | COMP165       | Computer Graphics           | 3            | COMP112      |
| 3  | IS431         | System Analysis and Design  | 3            | COMP113      |
| 4  | MATH153       | Mathematical Analysis (2)   | 3            | MATH152      |
| 5  | COMP206       | Advanced Visual Programming | 3            | COMP106      |
| 6  | COMP484       | Advanced Web Engineering    | 3            | COMP242      |
| 7  | COMP324       | XML Programming             | 3            | COMP242      |

|              |          |  |           |         |
|--------------|----------|--|-----------|---------|
| 8            | MATH 326 | Discrete Mathematics                                       | 3         | MATH153 |
| 9            | COMP 310 | Automata, Languages and Computation                        | 3         | COMP182 |
| 10           | COMP322  | Introduction to Operating Systems and Systems Architecture | 3         | COMP123 |
| 11           | COMP380  | Intro. to Software Engineering                             | 3         | IS431   |
| 12           | IS441    | Database Management Systems                                | 3         | COMP241 |
| 13           | BCGE006  | Research Methodology                                       | 3         | None    |
| 14           | COMP 469 | Intro. Artificial Intelligence                             | 3         | IS431   |
| 15           | COMP450  | Computer Ethics  | 3         | COMP484 |
| 16           | IS435    | Communication and Networking                               | 3         | COMP123 |
| 17           | COMP375  | Mobile Application Development                             | 3         | COMP242 |
| 18           | COMP242  | Introduction to Web Development                            | 3         | COMP113 |
| 19           | COMP106  | Visual Programming   | 3         | COMP112 |
| 20           | COMP467  | Multimedia System Design                                   | 3         | COMP242 |
| 21           | COMP424  | Computer System Security                                   | 3         | IS435   |
| 22           | COM485   | Human Computer Interaction                                 | 3         | COMP380 |
| 23           | COMP377  | Programming with Python                                    | 3         | COMP113 |
| <b>Total</b> |          |  | <b>69</b> |         |

### Major Requirements (Elective) Select 9 Cr (Computer Science)

| SN | Course Number | Course Title                              | Prerequisite | Credit Hours | SN | Course Number | Course Title                            | Prerequisite | Credit Hours |
|----|---------------|---|--------------|--------------|----|---------------|---|--------------|--------------|
| 1  | PHIL230       | Symbolic Logic                            | MATH152      | 3            | 11 | COMP270       | Business Programming                    | COMP241      | 3            |
| 2  | COMP232       | Concepts of Programming Languages         | COMP113      | 3            | 12 | COMP350       | E-Commerce                              | COMP242      | 3            |
| 3  | SOM485        | Decision Support System                   | COMP241      | 3            | 13 | COMP412       | Machine Learning                        | SOM120       | 3            |
| 4  | COMP224       | Web Development and user interface design | COMP242      | 3            | 14 | COMP410       | Data Mining                             | IS441        | 3            |
| 5  | COMP282       | Advanced Data Structures                  | COMP182      | 3            | 15 | COMP360       | Information Retrieval and Web Agents    | COMP242      | 3            |
| 6  | COMP431       | Computer Modeling and Simulation          | COMP182      | 3            | 16 | COMP497       | Selected Topics in Software Engineering | COMP380      | 3            |
| 7  | COMP479       | Neural networks                           | COMP113      | 3            | 17 | IS451         | System Development Project              | IS431        | 3            |
| 8  | COMP222       | Computer Organization                     | COMP123      | 3            | 18 | COMP420       | Advanced Operating System Concepts      | COMP322      | 3            |
| 9  | COMP411       | Knowledge Management                      | IS431        | 3            | 19 | COMP430       | Language Design and Compiler            | COMP113      | 3            |
| 10 | IS457         | Advanced Telecommunication and networking | IS435        | 3            | 20 | COMP381       | Open Source Software Engineering        | COMP282      | 3            |

## Advanced Diploma Degree (96 Credits)

### College General Requirements (Compulsory) 18 Cr

| SN           | Course Number | Course Title                    | Credit Hours | Prerequisite |
|--------------|---------------|---------------------------------|--------------|--------------|
| 1            | BCGE 001      | Arabic Language                 | 3            | None         |
| 2            | BCGE 002      | Islamic culture                 | 3            | None         |
| 3            | COMP 100      | Computers: Their Impact and use | 3            | None         |
| 4            | ENGL 002      | General English                 | 3            | None         |
| 5            | BCGE 004      | Study Skills                    | 3            | None         |
| 6            | BCGE009       | Entrepreneurship                | 3            | None         |
| 7            | IC3           | IC3                             | 0            | None         |
| <b>Total</b> |               |                                 | <b>18</b>    |              |

### Department Requirements (Compulsory) 24 Cr

| SN           | Course Number | Course Title                              | Credit Hours | Prerequisite |
|--------------|---------------|---|--------------|--------------|
| 1            | COMP112       | Algorithms and Programming (1)            | 3            | None         |
| 2            | COMP113       | Algorithms and Programming (2)            | 3            | Comp112      |
| 3            | MATH152       | Mathematical Analysis (1)                 | 3            | None         |
| 4            | ENGL004       | Technical Writing (1)                     | 3            | ENGL002      |
| 5            | ENGL030       | Technical Writing (2)                     | 3            | ENGL004      |
| 6            | COMP182       | Data Structure And Program Design         | 3            | COMP113      |
| 7            | COMP123       | Computer Architecture & Assembly Language | 3            | COMP112      |
| 8            | COMP241       | Introduction to Database                  | 3            | IS431        |
| <b>Total</b> |               |   | <b>24</b>    |              |

### Major Requirements (Compulsory) 51 Cr

| SN | Course Number | Course Title   | Credit Hours | Prerequisite |
|----|---------------|--|--------------|--------------|
| 1  | COMP324       | XML Programming  | 3            | COMP242      |
| 2  | COMP165       | Computer Graphics  | 3            | COMP112      |
| 3  | IS431         | Systems Analysis and Design                                | 3            | COMP113      |
| 4  | MATH153       | Mathematical Analysis (2)                                  | 3            | MATH152      |
| 5  | COMP206       | Advanced Visual Programming                                | 3            | COMP106      |
| 6  | COMP484       | Advanced Web Engineering                                   | 3            | COMP242      |
| 7  | SOM120        | Basic Business Statistics                                  | 3            | MATH152      |
| 8  | MATH326       | Discrete Mathematics                                       | 3            | MATH153      |
| 9  | COMP310       | Automata, Languages and Computation                        | 3            | COMP182      |
| 10 | COMP375       | Mobile Application Development                             | 3            | COMP242      |
| 11 | COMP322       | Introduction to Operating Systems and Systems Architecture | 3            | COMP123      |
| 12 | COMP380       | Intro. to Software Engineering                             | 3            | IS431        |

|              |         |                                 |           |         |
|--------------|---------|---------------------------------|-----------|---------|
| 13           | IS 441  | Database Management System      | 3         | COMP241 |
| 14           | BCGE006 | Research Methodology            | 3         | None    |
| 15           | IS435   | Communication and Networking    | 3         | COMP123 |
| 16           | COMP242 | Introduction to Web Development | 3         | COMP113 |
| 17           | COMP106 | Visual Programming              | 3         | COMP112 |
| <b>Total</b> |         |                                 | <b>51</b> |         |

### Major Requirements (Elective) Select 3 Cr (Computer Science)

| SN | Course Number | Course Title                              | Prerequisite | Credit Hours |  | SN | Course Number | Course Title                            | Prerequisite | Credit Hours |
|----|---------------|---|--------------|--------------|--|----|---------------|---|--------------|--------------|
| 1  | PHIL230       | Symbolic Logic                            | MATH152      | 3            |  | 11 | COMP270       | Business Programming                    | COMP241      | 3            |
| 2  | COMP232       | Concepts of Programming Languages         | COMP113      | 3            |  | 12 | COMP350       | E-Commerce                              | COMP242      | 3            |
| 3  | SOM485        | Decision Support System                   | COMP241      | 3            |  | 13 | COMP412       | Machine Learning                        | SOM120       | 3            |
| 4  | COMP224       | Web Development and user interface design | COMP242      | 3            |  | 14 | COMP410       | Data Mining                             | IS441        | 3            |
| 5  | COMP282       | Advanced Data Structures                  | COMP182      | 3            |  | 15 | COMP360       | Information Retrieval and Web Agents    | COMP242      | 3            |
| 6  | COMP431       | Computer Modeling and Simulation          | COMP182      | 3            |  | 16 | COMP497       | Selected Topics in Software Engineering | COMP380      | 3            |
| 7  | COMP479       | Neural networks                           | COMP113      | 3            |  | 17 | IS451         | System Development Project              | IS431        | 3            |
| 8  | COMP222       | Computer Organization                     | COMP123      | 3            |  | 18 | COMP420       | Advanced Operation System Concepts      | COMP322      | 3            |
| 9  | COMP411       | Knowledge Management                      | IS431        | 3            |  | 19 | COMP430       | Language Design and Compiler            | COMP113      | 3            |
| 10 | IS457         | Advanced Telecommunication and networking | IS435        | 3            |  | 20 | COMP381       | Open Source Software Engineering        | COMP282      | 3            |

## Diploma Degree (66 Credits)

### College General Requirements (Compulsory) 15 Cr

| SN           | Course Number | Course Title                    | Credit Hours | Prerequisite |
|--------------|---------------|---------------------------------|--------------|--------------|
| 1            | BCGE001       | Arabic Language                 | 3            | None         |
| 2            | BCGE004       | Study Skill                     | 3            | None         |
| 3            | COMP100       | Computers: Their Impact and use | 3            | None         |
| 4            | ENGL002       | General English                 | 3            | None         |
| 5            | BCGE009       | Entrepreneurship                | 3            | None         |
| 6            | IC3           | IC3                             | 0            | None         |
| <b>Total</b> |               |                                 | <b>15</b>    |              |

### Department Requirements (Compulsory) 24 Cr

| SN           | Course Number | Course Title                              | Credit Hours | Prerequisite |
|--------------|---------------|---|--------------|--------------|
| 1            | COMP112       | Algorithms and Programming (1)            | 3            | None         |
| 2            | COMP113       | Algorithms and Programming (2)            | 3            | Comp112      |
| 3            | MATH152       | Mathematical Analysis (1)                 | 3            | None         |
| 4            | ENGL004       | Technical Writing (1)                     | 3            | ENGL002      |
| 5            | ENGL030       | Technical Writing (2)                     | 3            | ENGL004      |
| 6            | COMP182       | Data Structure And Program Design         | 3            | COMP113      |
| 7            | COMP123       | Computer Architecture & Assembly Language | 3            | COMP112      |
| 8            | COMP241       | Introduction To Database                  | 3            | IS431        |
| <b>Total</b> |               |   | <b>24</b>    |              |

### Major Requirements (Compulsory) 27 Cr

| SN           | Course Number | Course Title   | Credit Hours | Prerequisite |
|--------------|---------------|--|--------------|--------------|
| 1            | COMP 165      | Computer Graphics  | 3            | COMP112      |
| 2            | IS 431        | Systems Analysis and Design                                | 3            | COMP113      |
| 3            | MATH 153      | Mathematical Analysis (2)                                  | 3            | MATH152      |
| 4            | COMP 206      | Advanced Visual Programming                                | 3            | COMP 106     |
| 5            | COMP 322      | Introduction to Operating Systems and Systems Architecture | 3            | COMP123      |
| 6            | BCGE006       | Research Methodology                                       | 3            | None         |
| 7            | IS 435        | Communication and Networking                               | 3            | COMP123      |
| 8            | COMP242       | Introduction to Web Development                            | 3            | COMP113      |
| 9            | COMP106       | Visual Basic   | 3            | COMP112      |
| <b>Total</b> |               |  | <b>27</b>    |              |



# Course Description for Computer Science Program

## **COMP112 Algorithms and Programming (1) (3 Hrs. Prerequisite: None)**

COMP112 is an introduction to the field of computer programming and algorithmic problem solving. The course will provide an understanding of fundamental How to design an algorithm that solves a computational problem? The course will present techniques that can help students to discover an efficient solution using JAVA programming concepts and constructs. Students will have the opportunity to create, compile, and execute programs in a modern programming language.

Design a computer program based on a given algorithm. Identify the various activities involved in translation a given problem into a corresponding executable program. Use windows environment to write and execute a program on a computer. Use the basic structures of JAVA programming language including data types; input/output statements, operators and expressions, control structures, strings, Predefined functions and arrays

## **MATH152 Mathematical Analysis I (3 Hrs. Prerequisite: None)**

Course Description: Mathematical Analysis-1 course covers elementary concepts about sets, real numbers, relations and functions. This course includes the following topics: Basic set concepts, Universal set and empty set, Venn diagram, Set operations and their algebra, Classes of sets, power set, Real number system, Inequalities, Intervals, Relations and their types, Relation Composition, Partition, Graphs of the function and their types.

## **COMP100 Computer: Impacts and Uses (3 Hrs. Prerequisite: None)**

COMP100 is an introductory course to the computer skills. Learn basic computer skills by using Microsoft office suite (including MS-Word, MS-PowerPoint, MS-Excel, MS-Publisher) and the use of Internet & World Wide Web. The focus on this course is on the basic knowledge required to be computer literate in today's society and digital world

## **ENGL002 General English (3 Hrs. Prerequisite: None)**

The course is intended for students at beginner level to upper - intermediate level. It follows an integrated multi-skills approach in developing the student's performance in English. It lays special emphasis on the productive skills and uses authentic material relevant situations and language functions which are presented throughout the course.

## **BCGE004 Study Skills (3 Hrs. Prerequisite: None)**

The course helps students to improve their English and gives them skill and practice in using English as a language of instruction; in this case they can improve their study habits in English. The course stresses the fact that once the skill has been introduced, it is the student's responsibility to continue practicing it on his/her own until it is mastered efficiently. Therefore, the course deals with topics such as using an English dictionary, learning vocabulary in English, outlining, improving your reading, using a library and preparing for examinations.

**COMP113 Algorithms and Programming (2) (3 Hrs. Prerequisite: COMP112)**

An introduction to basic and advanced concepts of object-oriented programming: inheritance; interfaces; abstract classes; polymorphism; exception handling; GUI design; and applets.

**COMP123 Computer Architecture and Assembly Language (3 Hrs. Prerequisite: COMP112)**

The course covers the following topics: Introduction to computer architecture, assembly language programming, system software and computer applications, number systems and data representation, internal organization of a computer, Boolean algebra and digital logic, primitive instructions and operations, and Assembly language. (Integrated lecture/lab environment)

**BCGE006 Research Methodology (3 Hrs. Prerequisite: - None)**

This course provides knowledge about the concept, importance, benefits, and objectives of the research methods. The course provides knowledge about collection, classifying, summarizing, and analyzing of data as well as it provides the steps of conducting the basic academic research. Information related to research's report, research methodology, and exploring results are provided.

**MATH153 Mathematical Analysis-2 (3 Hrs. Prerequisite: MATH152)**

Course Description: Mathematical Analysis-2 course is an elementary course of Calculus. It covers two branches of the Calculus: Differential Calculus and Integral Calculus. This course includes the following topics: Basic formula to simplify the function, Rationalize and factors, Concept of Limit, Indeterminate Forms, Limits of different functions and rules to find it, Definition of Derivative, Rules of Differentiation, Rules of Differentiation, Derivatives of Different Functions, Introduction to Integral Calculus, Concept of Integration, Concept of Integration, Techniques of Integration, Techniques of Integration and Substitution Method.

**ENGL004 Technical writing (1) (3 Hrs. Prerequisite: - ENGL002)**

This is an ESP course aims at developing technical writing skills for students majoring in business areas and computer science. It focuses on promoting fluency in writing and providing language, writing models, that will be relevant to student's real needs in business affairs . Also, it enables students to practice appropriate vocabulary, grammatical structures, punctuation, spelling, style, and writing conventions. The purpose of this course is to help students utilize varied forms of technical writing to achieve success in the workplace as well as academic contexts. It covers the common types of writing that occur in the business and computer science worlds.

**BCGE009 -ENTREPRENEURSHIP (3 Hrs. Prerequisite: None)**

The course aims at imparting basic knowledge about entrepreneurship and entrepreneurs. Topics covered include entrepreneurship process, business planning process, project financing and valuation, business models and strategies, phases of entrepreneurial growth. An overview of business practices in the world with special emphasis on GCC and Sultanate of Oman in particular is covered.

**COMP106 Visual Programming (3 Hrs. Prerequisite: COMP112)**

Understand and implement visual aspects of doing programs in software development with the help of graphical user interface environment. This course provides students with the knowledge needed to

develop applications in Microsoft Visual Basic.NET for the Microsoft .NET platform. The course focuses on user interfaces, program structure, language syntax, and implementation details.

### **ENGL030 Technical Writing (2) (3 Hrs. Prerequisite: ENGL004)**

This is an ESP course aims at developing technical writing skills for students majoring in information technology (IT). It focuses on promoting writing fluency and providing language, writing models, which will be relevant to the real needs of the students. It prepares students to produce competent technical documents for both written and digital media with special emphases on problem-solving and decision-making reports. It provides students with principles of research and documentation, drafting and revision processes, technical proposals, and research papers and technical descriptions. It covers the aspects of collaborative and individual research works to analyze and write about various forms of data in information technology (IT).

### **IS431 Systems Analysis and Design (3 Hrs. Prerequisite: COMP113)**

This course covers the systems development life cycle. Topics include standard tools and techniques to analyze and design an information system from a structured as well as an object-oriented perspective. A Computer-Aided Software Engineering (CASE) tool is used to facilitate the study.

### **COMP165 Computer Graphics (3 Hrs. Prerequisite: COMP112)**

Interactive computer graphics, Geometry of computer graphics, primitives, two- and three-dimensional representation; Transformation; Data structures; Windowing and Clipping; An integrated lecture/lab environment is provided for this course, using OpenGL hosted in C++ or Java.

### **BCGE001 Arabic Language (3 Hrs. Prerequisite: None)**

1. دراسة مدخل لمفهوم وسائل الإتصال وأنواعه
2. دراسة نصوص: القرآن\_ الحديث\_ النثر\_ الشعر\_ مبادئ\_ البلاغة: البيان\_ البديع\_ المعاني\_ وأنواعها\_ الأسلوب\_ الإنشائي: الأمر\_ النهي\_ التمني\_ النداء\_ الاستفهام\_ مبادئ\_ في\_ النحو\_ والصرف\_ والإملاء\_ المعربات\_ والمبنيات\_ المعرفة\_ والنكرة\_ المشتقات\_ قواعد\_ الهمزة\_ وعلامات\_ الترقيم\_ استخدام\_ المعاجم\_ اللغوية.

### **COMP182 Data Structures and Program Design (3 Hrs. Prerequisite: COMP113)**

This course is designed to teach you how to program efficiently. It assumes that you know the basics of programming in C++, and you can write, debug and run simple programs in C++. The purpose of this course is to provide the students with solid foundations in the basic concepts of programming: data structures and algorithms. The main objective of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might encounter. This course is also about showing the correctness of algorithms and studying their computational complexities. This course offers the students a mixture of theoretical knowledge and practical experience.

**COMP241 Introduction to Database (3 Hrs. Prerequisite: IS431)**

An introduction to databases: database system architecture; logical organization of databases; entity relationship model; hierarchical, network, and relational data models; functional dependencies and normal forms. Design, implementation, and optimization of query languages.

**IS435 Communication and Networking (3 Hrs. Prerequisite: COMP123)**

This course introduces the basic components of computer networks from software and hardware point of view. The role of physical components like network interface adapters, modems, cables, hubs and switches is explained. Basic network design using structured cabling and transmission of digital data as electronic signals is presented. The layered structure of network protocols is discussed. It emphasizes on protocol and interface specifications, in particular those adhering to OSI and TCP/IP reference models. The application layer protocols of TCP/IP such as HTTP, FTP, Telnet, and SMTP will be studied. Classification of networks on the basis of IP and structure of IP address is discussed. Sub netting is covered in this course and methods to find the errors and recover them in the data transmission are studied.

**COMP206 Advance Visual Programming (3 Hrs. Prerequisite: COMP106)**

Design and implement advanced visual aspects of doing programs in software development with the help of graphical user interface environment. This course provides students with the knowledge needed to develop advanced applications in Microsoft Visual Basic.NET for the Microsoft .NET Platform. The course focuses on advanced features of user interfaces, program structure, language-syntax and implementation details. It also focuses on developing data-driven applications with reports and printing features.

**COMP322 Introduction to Operating Systems and System Architecture (3 Hrs. Prerequisite: COMP123)**

Describes functional modeling as a means to document and understand requirements; Introduce Object-Oriented Systems, and the operating system structure; determine the memory management strategies; staffs the project and puts several activities in place to help process scheduling. ; introduces the deadlock characterization; Illustrate understanding of the swapping, paging and segmentation; should be introduces the file System concepts and methods.

**COMP242 Introduction to web development (3 Hrs. Prerequisite: COMP113)**

Upon the successful completion of this course, a student will be able to Demonstrate basic HTML coding: create formatted text, write both absolute and relative links, write lists add visual elements and graphics, change color of text and background build tables, produce inline and embedded CSS (for formatting and page layout),insert multimedia elements, build tables, The purpose of this course is to provide students with an understanding of basic Web design and Web authoring skills in addition to the technical expertise required for creating and publishing of standards compliant HTML documents.

**COMP324 XML Programming (3 Hrs. Prerequisite: COMP242)**

This course introduces the basics of XML language and syntax, comparison between XML and HTML, Document type Definition (DTD), XML schema, Extensible stylesheet language (XSL) including XSL transformations (XSLT), XPath for navigating in XML documents, and XSL-FO for formatting XML documents.

### **Comp484 Advanced Web Engineering (3 Hrs. Prerequisite: COMP242)**

Course Description: This course is designed to introduce the student to the tools and facilities of Web design: page composition, PHP, web design and, code validation. Students will use these software technologies together to produce web design projects. Students will cover the Web design development process, with Macromedia Dreamweaver as the primary Web development tool. Topics covered include basic and enhanced site structure, local and remote site management, and optimization of Web graphics.

### **MATH326 Discrete Mathematics (3 Hrs. Prerequisite: MATH153)**

Course Description: The goal of this course is to introduce students with ideas and techniques of discrete mathematics that are widely used in Computer Science. Discrete Mathematics concerns with a process that consists of a sequence of individual steps which distinguishes it from Calculus. In this course we will study different discrete structures which include matrices, reduced echelon form, logical and propositional calculus, counting techniques, sequences recursive relations, mathematical induction.

### **SOM120 Basic Business Statistics (3 Hrs. Prerequisite: Math152)**

Basic elements of statistics for students in business and economics. Descriptive statistics, elements of probability, probability distributions (including normal), sampling distributions, statistical inference for means and proportions (including estimation and hypothesis testing), simple linear regression and correlation. Applications of these topics in business and economics are emphasized. The course requires assignments in which students are required to explain the results of statistical computations using personal computer software.

### **COMP380 Introduction to Software Engineering (3 Hrs. Prerequisite.: IS431)**

Concepts and techniques for systems engineering, requirements analysis, design, implementation and testing of large-scale computer systems. Principles of software engineering for production of reliable, maintainable and portable software products. Emphasis on object-oriented analysis and design techniques. Topics include unit, integration and systems testing, configuration management, software quality assurance practices, and an introduction to Computer Aided Software Engineering (CASE). This is a lecture portion of a course in software engineering involving the design and partial implementation of a software system as a group project.

### **IS441 Database Management Systems (3 Hrs. Prerequisite: COMP241)**

The design and implementation of computerized databases. Provides background for the selection and use of database management systems. Topics include types of available systems, data independence, integrity, privacy and query. The student will design and implement a database utilizing a commercial database management system.

### **COMP310 Automata, Languages and Computation (3 Hrs. Prerequisite: COMP182)**

The course explains the basic principles of formal languages and abstract models of computation. Some of the major topics covered in this course includes: An overview of computation theory, languages, Grammars, Automata, Regular grammars, normal forms, and Pushdown Automata.

### **COMP375 Mobile Application Development: (3 Hrs. Prerequisite: COMP242)**

As mobile devices are becoming more everywhere, developers are now devoting significant effort to build applications for these smartphone and tablet devices. This course examines the principles of mobile application design and development. It provides students with the knowledge needed to develop mobile applications using xml and java concepts using Android platform. Topics will include introduction to mobile computing, existing approaches and available technologies, mobile application development architectures, user interface design and building, input methods, data handling, messaging, network

### **BCGE002 Islamic Culture (3 Hrs. Prerequisite: None)**

1. يتضمن دراسة أهمية الثقافة الإسلامية ، وأهمية الدين في حياة الإنسان ، وأثر العقيدة الصحيحة في حياة الإنسان وسلوكه ، والعقيدة الإسلامية وأركان الإسلام ونظامه التشريعي ، والمرأة ومكانتها في الإسلام ، والغزو الفكري وأهدافه ووسائله وأخطاره ، حفظ سورة من القرآن الكريم مع تفسيرها .
2. المتطلبات الأولية المساق: لا توجد
3. عدد الساعات المعتمدة: 3 ساعات

### **COMP490 Senior Project (3 Hrs. Prerequisite: Department Approval)**

Concurrently students will work in teams of 2 to 4 members to construct a significant software application. Students will apply concepts, techniques, and CASE Tools introduced in previous courses. Team members will give a presentation of their contribution to the project, techniques, location-based services, content providers and security issues in mobile applications.

### **BCGE003 Omani Society (3 Hrs. Prerequisite: None)**

*النتائج المرجوة من تدريس المقرر*

*ما الذي يجب أن يكون الطالب قد تعلمه أو أصبح قادرا على القيام به بعد دراسة هذا المقرر؟*

*يتعرف على البيئة العمانية ومكوناتها.*

*يتعرف على البعد الديموغرافي والخصائص السكانية للمجتمع العماني*

*يتعرف على التنظيم الإداري والسياسي*

*يتعرف على أبرز سمات البعد الاقتصادي قبل وبعد النهضة*

*يتعرف على خصائص المجتمع العماني من حيث: الأسرة- التعليم – الصحة- الثقافة.*

### **COMP467 Multimedia Systems Design (3 Hrs. Prerequisite: COMP242)**

Multimedia Systems Design course help student to study the fundamentals of digital media elements such as audio, image, and video, emerging techniques and standards will provide the skills to better manage the digital representation, storage and distribution of media. Students will gain skills and techniques needed to create and produced Professional-Looking images, videos, animation and motion graphics. The course is ideal for those who want to gain a thorough knowledge and understanding of multimedia development tools and techniques and who want to enhance their career prospects in the process.

### **COMP485 Human-Computer Interaction (3 Hrs. Prerequisite: COMP380)**

The information exchange between humans and computer systems will be examined. Aspects of input/output devices, software engineering, and human factors will be discussed with respect to human-computer interactions. Topics include: text and graphic display; user modelling; program design, debugging, complexity and comprehension; and current research studies and methodologies.

### **COMP377 Programming with Python (3 Hrs. Prerequisite: COMP113)**

Python programming is a good skill to have in data science, AI IOTs and Machine Learning. Introduction to Python Programming course is intended for students with little or no programming experience. It aims to provide students with an understanding of the role computation can play in solving problems and, regardless of their major, feel justifiably confident of their ability to write small programs that allow them to accomplish useful goals.

### **COMP 424 Computer System Security (3 Hrs. Prerequisite: IS435)**

The class is concerned with the fundamentals of computer security. Topics in this class can be divided into three main parts: cryptography (with a focus on single -key and public key), computer system security (database and operating systems issues including authentication, access control, malicious software); as well as network security (including intrusion prevention/firewalls, intrusion detection, Denial of Service attacks, etc.).

### **COMP469 Introduction to Artificial Intelligence (3 Hrs. Prerequisite:- IS431)**

Artificial intelligence (AI) is at the interface between computer science, philosophy, linguistics, and mathematics. On the one hand, AI seeks to develop systems which appear to behave intelligently and interact naturally and intuitively with users. On the other hand, AI seeks to understand human intelligence through simulations of behavior at all levels of complexity. Putting AI techniques into practical applications requires an understanding of how humans learn, structure, and uses their knowledge as well as the nature of computers, the software systems which they support and the organizations within which they are used. The student will be able to write prolog programs and understand the concepts of search.

### **COMP450 Computer Ethics (3 Hrs. Prerequisite: COMP484)**

The course concentrates on the theory and practice of computer ethics. The aim of the course is to study the basis for ethical decision-making and the methodology for reaching ethical decisions concerning computing matters. The course also introduces the insights and methods of moral philosophy to a practical examination of contemporary moral problems and normative issues of public policy concern the conduct and responsibilities of individuals and firms in the use of Computer including hardware and software in the organization. It also relates the role of the use of the computer in the economic institutions in society and hence the understanding of the meta ethics. It also provides the idea of dealing with the internet, Patent, Trademark, shareware and commercial software.

## **Elective Courses**

### **PHIL230 Symbolic logic (3 Hrs. Prerequisite: MATH152)**

In this course we will cover a natural deduction system of elementary symbolic logic. Introduction to modern deductive logic includes propositional logic and theory of quantification. We will also discuss philosophical aspects of symbolic logic whenever appropriate

### **COMP232 Concepts of Programming Languages (3 Hrs. Prerequisite: COMP113)**

In this course we will cover issues in the design, implementation, and use of high-level programming languages. Historical background. How languages reflect different design philosophies and user requirements. Technical issues in the design of major imperative (procedural) programming languages. Other approaches to programming: functional programming, logic programming, and object-oriented programming.

### **SOM485 Decision Support Systems (3 Hrs. Prerequisite: COMP241)**

The course covers the issues of providing the right information critical to effective management as well as a variety of models and computer-based tools to assist management and decision-making. Demonstrate user interfaces, group DSS, and intelligent DSS. The course identifies appropriate uses of various hardware and software tools to analyze business problems and provides a framework for the application of IT in solving them

### **COMP 224 Web Development and User Interface Design (3 Hrs. Prerequisite: COMP 242)**

This course provides basics of internet; different types of technologies used in internet environment and demonstrate how it works. It also covers various technologies and tools used to design a web page, particularly by using HTML, JavaScript. It also teaches how we design dynamic web pages on server side by giving dynamic effects using scripting languages like Java Script and ASP. The student will design, develop and implement a web site using what he/she has learnt from the course practically.

### **COMP282 Advanced Data Structure (3 Hrs. Prerequisite: COMP182)**

Survey of the components of ADT; Implementing linked list and the Circular; Using of doubly linked list; Logical and physical representation of data; tree representation; data structure operations, matrix representations with stack and Queue.; searching techniques with Binary trees; Solve problems by using graph and explain the difference between a depth-first and a breadth-first search and to implement these searching strategies using stacks and queues, solve problems by using heap and heap sort methods.

### **COMP 431 Computer Modelling and Simulation (3 Hrs. Prerequisite: COMP182)**

A conceptual foundation for discrete event and continuous time simulation on computers is presented. Statistical considerations such as random number generation, design of experiments, output analysis and model correctness are considered. Programming in discrete event simulation languages such as GPSS, Simscript or SIMULA. Implementation issues for simulation languages.



### **COMP 479 Neural Network (3 Hrs. Prerequisite. COMP 113)**

Overview of neural network history and types of problems: function approximation, classification, data clustering, time series, and dynamic systems, Feed forward Neural networks and radial Basis Function theory and background of neural networks nonlinear dynamic black-box modeling, classification and clustering with neural networks.

### **COMP 222. Computer Organization (3 Hrs. Prerequisite: COMP123)**

Extension of basic addressing concepts to more advanced addressability, such as base register and self-relative addressing. Comparative computer architecture focusing on such organizations as multiple register processors and stack machines. Basics of virtual memory input-output. Introduction to the concept of micro programmable systems. Low-level language translation process associated with assemblers. System functions such as relocatable loading and memory management. Application of data structure and hashing techniques to the above. Other related topics.

### **IS 411 Knowledge Management (3 Hrs. Prerequisite: IS431)**

Provides an understanding of the knowledge and its applications in an organization. Growing interest in knowledge management and its practices. Principles of knowledge management, varieties of systems and related supporting technologies. Reuse of knowledge management and its impact on I.T infrastructure. Team-building and goal-setting exercises to create knowledge management projects.

### **IS457 Advanced Telecommunication and networking (3 Hrs. Prerequisite: IS435)**

An advanced course in telecommunications and networks emphasizing enterprise networking topics such as: network operating systems, network analysis and design, network security, virtual private networks, collaboration, wireless networks, VLAN, multi-platform integration, voice-over Internet protocol, web server strategies and storage area networks. This course will include hands-on projects involving network design and implementation.

### **COMP270 Business Programming (3 Hrs. Prerequisite: COMP241)**

This course uses the latest database tools and techniques for persistent data and object-modeling and management. Students gain extensive hands-on experience with exercises and a term project using Oracle, SQL Server, and other leading database management systems. Students learn the standards-based Structured Query Language (SQL) and the extensions to the SQL standards implemented in Oracle and SQL Server. Students learn the basics of database programming, and write simple stored procedures and triggers.

### **COMP420 Advanced Operating Systems Concepts (3 Hrs. Prereq: - COMP322)**

This course consists of advance level of knowledge related to operating systems. The course will introduce the classic synchronization, concurrency, Dining Philosophers, race conditions, acquiring and releasing lock, Use of Mutex, different types of memory management and re-locatable address generations, swapping and fragmentations, virtual allocation of memory logically and physically. Types of file systems, input and output device management and their controller and interrupt with driven I/O. Security, user authentication, security counter measures, protection domain, mechanism, attacks, and security approaches for mobile code.

**COMP350 E-Commerce (3 Hrs. Prerequisite: COMP 242)**

This course introduces principles of the Internet Economy; Business to business, business to consumers, and consumer to consumer; infrastructure of e-commerce; processes in building e-commerce website; outsource or hosting of e-commerce website; e-commerce payment systems; key dimensions of e-commerce security and encryption.

**COMP412 Machine Learning (3 Hrs. Prerequisite: SOM120)**

A study of the concepts, principles, techniques, and applications of machine learning. Topics include concept-based learning, information-based learning (decision trees and ID3 algorithms), rule-based learning (association rules, learning ordered rules, learning unordered rules, and descriptive rule learning), distance-based learning (nearest neighbor algorithms), probability-based learning (Bayesian classifiers and networks), and error-based learning (perceptron, multivariable linear regression with gradient descent, nonlinear and multidimensional models, artificial neural networks, and support vector machines). Model ensembles learning and reinforcement learning are also discussed.

**COMP410 Data Mining (3 Hrs. Prerequisite: IS441)**

A study of the concepts, principles, techniques and applications of data mining. Topics include data preprocessing, the ChiMerge algorithm, data warehousing, OLAP technology, the Apriori algorithm for mining frequent patterns, classification methods (such as decision tree induction, Bayesian classification, neural networks, support vector machines and genetic algorithms), clustering methods (such as k-means algorithm, hierarchical clustering methods and self-organizing feature map) and data mining applications (such as Web, finance, telecommunication, biology, medicine, science and engineering). Privacy protection and information security in data mining are also discussed.

**COMP 430 Language Design and Compilers (3 Hrs. Prerequisite: COMP113)**

*Attempted Upper Division Writing Proficiency Exam.* Examination of the issues involved in the design and subsequent implementation of programming languages. Considerations of implementation difficulties, including various features in a programming language. Tools and techniques to facilitate both the processing of programming languages and the building of programming processors. Available for graduate credit.

**COMP497 Selected Topic in Software Engineering (3 Hrs. Prerequisite: COMP380)**

An innovative course of study. Topics to be specified in the schedule of classes. Different topics may be taken for credit.

**COMP 381 Open Source Software Engineering (3 Hrs. Prerequisite: COMP282)**

Introduction to open source software engineering concepts, principles and applications. Topics include history of open source software, open source software engineering models, open source products and software quality, strategies and business models, government policies toward open source software, work organization of open source software development, software and intellectual property rights, organizations of the open source community, and case studies. Different open source software products for various applications are also discussed and used for group projects.



Revised  
May 2019

C.S

Information Technology Department  
Study Plan for Bachelor Degree in Computer Science

| Year                    | Course Number | Course Title                    | Pre-Requisite | Units     | Course Number          | Course Title   | Pre-Requisite | Units      |  |
|-------------------------|---------------|---------------------------------|---------------|-----------|------------------------|--|---------------|------------|--|
| <b>First Semester</b>   |               |                                 |               |           | <b>Second Semester</b> |  |               |            |  |
| 1                       | COMP112       | Algorithms and Programming (1)  |               | 3         | COMP113                | Algorithms and Programming (2)                             | COMP112       | 3          |  |
|                         | MATH152       | Mathematical Analysis (1)       |               | 3         | COMP123                | Computer Architecture and Assembly Language                | COMP112       | 3          |  |
|                         | COMP100       | Computers: Their Impact and Use |               | 3         | BCGE006                | Research Methodology                                       |               | 3          |  |
|                         | ENGL002       | General English                 |               | 3         | MATH153                | Mathematical Analysis (2)                                  | MATH152       | 3          |  |
|                         | BCGE004       | Study Skills                    |               | 3         | ENGL004                | Technical Writing, I                                       | ENGL002       | 3          |  |
|                         |               |                                 |               |           | BCGE009                | Entrepreneurship   |               | 3          |  |
|                         |               | <b>Total</b>                    |               | <b>15</b> |                        |  | <b>Total</b>  | <b>18</b>  |  |
| <b>Third Semester</b>   |               |                                 |               |           | <b>Fourth Semester</b> |  |               |            |  |
| 2                       | COMP106       | Visual Programming              | COMP112       | 3         | COMP182                | Data Structure and Program Design                          | COMP113       | 3          |  |
|                         | ENGL030       | Technical Writing II            | ENGL004       | 3         | COMP241                | Introduction to Database                                   | IS 431        | 3          |  |
|                         | IS431         | Systems Analysis and Design     | COMP113       | 3         | IS435                  | Communication and Networking                               | COMP123       | 3          |  |
|                         | COMP165       | Computer Graphics               | COMP112       | 3         | COMP206                | Advanced Visual Programming                                | COMP106       | 3          |  |
|                         | BCGE001       | Arabic Language                 |               | 3         | COMP322                | Introduction to Operating Systems and Systems Architecture | COMP 123      | 3          |  |
|                         |               |                                 |               |           | COMP242                | Introduction to Web Development                            | COMP113       | 3          |  |
|                         |               | <b>Total</b>                    |               | <b>15</b> |                        |  | <b>Total</b>  | <b>18</b>  |  |
| <b>Fifth Semester</b>   |               |                                 |               |           | <b>Sixth Semester</b>  |  |               |            |  |
| 3                       | COMP324       | XML Programming                 | COMP242       | 3         | COMP380                | Introduction to Software Engineering                       | IS431         | 3          |  |
|                         | COMP484       | Advanced Web Engineering        | COMP242       | 3         | IS441                  | Database Management Systems                                | COMP241       | 3          |  |
|                         | MATH326       | Discrete Mathematics            | MATH 153      | 3         | COMP310                | Automata Languages and Computation                         | COMP182       | 3          |  |
|                         |               | Elective                        |               | 3         | COMP375                | Mobile Application Development                             | COMP242       | 3          |  |
|                         | SOM120        | Basic Business Statistics       | MATH152       | 3         | BCGE002                | Islamic Culture  |               | 3          |  |
|                         |               | <b>Total</b>                    |               | <b>15</b> |                        |  | <b>Total</b>  | <b>15</b>  |  |
| <b>Seventh Semester</b> |               |                                 |               |           | <b>Eighth Semester</b> |  |               |            |  |
| 4                       | COMP490       | Senior Project                  | Dept Appr.    | 3         | COMP377                | Programming with Python                                    | COMP113       | 3          |  |
|                         | BCGE003       | Omani Society                   |               | 3         | COMP424                | Computer System Security                                   | IS 435        | 3          |  |
|                         | COMP467       | Multimedia System Design        | COMP242       | 3         | COMP469                | Introduction to Artificial Intelligence                    | IS431         | 3          |  |
|                         |               | Elective                        |               | 3         |                        | Elective   |               | 3          |  |
|                         | COMP485       | Human Computer Interaction      | COMP380       | 3         | COMP450                | Computer Ethics  | COMP484       | 3          |  |
|                         |               | <b>Total</b>                    |               | <b>15</b> |                        | <b>Total</b>   |               | <b>15</b>  |  |
| <b>Total Units</b>      |               |                                 |               |           |                        |  |               | <b>126</b> |  |

List of Elective Courses

|    |         |   |         |   |    |         |   |         |   |
|----|---------|---|---------|---|----|---------|---|---------|---|
| 1  | PHIL230 | Symbolic Logic                            | MATH152 | 3 | 11 | COMP270 | Business Programming                    | COMP241 | 3 |
| 2  | COMP232 | Concepts of Programming Languages         | COMP113 | 3 | 12 | COMP350 | E-Commerce                              | COMP242 | 3 |
| 3  | SOM485  | Decision Support System                   | COMP241 | 3 | 13 | COMP412 | Machine Learning                        | SOM120  | 3 |
| 4  | COMP224 | Web Development and user interface design | COMP242 | 3 | 14 | COMP410 | Data Mining                             | IS441   | 3 |
| 5  | COMP282 | Advanced Data Structures                  | COMP182 | 3 | 15 | COMP360 | Information Retrieval and Web Agents    | COMP242 | 3 |
| 6  | COMP431 | Computer Modeling and Simulation          | COMP182 | 3 | 16 | COMP497 | Selected Topics in Software Engineering | COMP380 | 3 |
| 7  | COMP479 | Neural networks                           | COMP113 | 3 | 17 | IS451   | System Development Project              | IS431   | 3 |
| 8  | COMP222 | Computer Organization                     | COMP123 | 3 | 18 | COMP420 | Advanced Operation System Concepts      | COMP322 | 3 |
| 9  | COMP411 | Knowledge Management                      | IS431   | 3 | 19 | COMP430 | Language Design and Compiler            | COMP113 | 3 |
| 10 | IS457   | Advanced Telecommunication and networking | IS435   | 3 | 20 | COMP381 | Open Source Software Engineering        | COMP282 | 3 |

**Note:** In addition, the student can also choose any I.T course as an elective from other IT study plan.