DOMINICAN UNIVERSITY IBADAN

NIGERIA

DEPARTMENT OF PHYSICAL AND MATHEMATICAL SCIENCES

A HANDBOOK FOR STUDENTS

Revised January 2020

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INTRODUCTION

This handbook contains basic information and regulations on Computer Science programme which is the only programme currently under the Department. Hence, the handbook will be revised as more programmes are made available in the Department. The regulations contained in this handbook are also subject to revision whenever there are changes in the University and/or Faculty regulations.

Programme Title: B. Sc. Honours Degree (Computer Science)
Duration: 4 Years (8 Semester)

Philosophy:
The Computer Science undergraduate programme is designed to equip the students for their future professions. The programme is structured to engender creative and innovative skills in the students. Hence, it will be driven by the two interlocking elements: global currency and local relevance. By global currency, the programme provides students with the theoretical principles and engineering rigour that drive the latest computing innovations in the world. Our students will remain abreast with global innovations. By local relevance, the programme ensures that our students can creatively bring the best and latest innovations to bear on solving problems in Nigeria. By training our students to respond to the relevant needs of the people and industries in Nigeria, we can be sure they will have a greater chance of (self) employ-ability after graduation.

Dominican University Computer Science degree is an edge for scientific and technological career advancement; for acquisition of competence in computer programming, system analysis and development, database analysis and implementations, etc.; for the use of computer for the systematic understanding of the managerial sciences; for philosophical and ethical approach to the virtual world, given the philosophy that truth liberates. Going through the programme, a students gradually acquires skills in understanding theoretical problems and their computer aided solutions and applications to physical and real life situation. By this programme the students are also prepared for further studies in computer science and engineering or for diverse professional training in other related fields.

ADMISSION REQUIREMENTS

(1) Four-Year Degree programme.
To be admitted, candidate must possess five (5) credit passes at SSCE or GCE or NECO (O' level) including English Language and Mathematics and three Science subjects from the following list: Further Mathematics, Physics, Chemistry, Biology, Geography, Agricultural Science, Economics; with any other approved Art or Social Science subject. The five subjects must be had at one sitting. Alternatively, candidates must have at least six credit passes at two sittings including English Language and Mathematics and the above listed. The UTME subjects are Mathematics, English Language and two Science subjects as given above.

(2) Three-Year Degree—Direct Entry
To be eligible, (1) candidate must meet the O/Level requirements, as given above, and must possess GCE A/Level passes in Mathematics and at least one of the following Science Subjects: Physics, Chemistry, and Geography. (2) Equivalently, candidate must possess credit level pass in Ordinary National Diploma (OND) or Merit Pass in National Certificate in Education (NCE) certificate with Mathematics and any one of the Science subjects above as teaching subjects. (3) A first degree or Higher National Diploma in any Science Course, with at least a 2nd Class Upper Division.

STUDENT GENERAL CONDUCT AND DISCIPLINE

All students are expected to comport themselves in a respectable manner in the Department. Students are to refrain from the following while in the University:

i. All examination misconduct.
ii. Unruly behaviour
iii. Indecent behaviour and dressing
iv. Vandalism
v. Miscellaneous Hall offences
vi. Unauthorized use / displacement / damage to University property
vii. Pilfering
viii. Insubordination
ix. Direct sale of bed spaces / squatting in Halls of Residence
x. Illegal participation in the National Youth Service programme
xi. Illegal registration as full time students
xii. Infringement of other University regulations.

In addition, students must also refrain from the following criminal offences:

i. Fraud
ii. Theft
iii. Burglary
iv. Physical assault on or fighting with fellow students
v. Murder
vi. Membership of a secret cult inside or outside the campus
vii. Possession of fire arms
viii. Arson
ix. Rape
x. Possession and / or use of hard drug and drug trafficking
xi. Other criminal offences

Students caught with any of these offences or misconducts will be sent to the Student Disciplinary Committee without any hesitation for appropriate sanction(s).

COURSE REQUIREMENTS

The four levels of courses shall follow the numbering system 101 – 199, 201 – 299, 301 – 399, 401 – 499, with each course number prefixed by three character code indicating the course subjects. For example, CMP 202.

The following terminologies apply to the course system being offered in the department of Physical and Mathematical Sciences Department:

(a) **Compulsory**: A course specified by the Department which a student must take and pass with 40% and above.
(b) **Required**: A course specified by the Department which a student must take at a level of study and must pass before graduation. The Department usually will specify the minimum number of units to be passed where there are a number of such courses.
(c) **Elective**: The courses specified by the Department which a student can take in order to increase the total number of his/her units. Students may graduate without passing the course provided the minimum credit for graduation had been attained.
(d) **Pre-requisite**: A course which students must take and pass before taking a particular course at a higher level.
(e) **Concurrent**: A course which a student must take during the same semester as another specified course.

All the courses registered/taken by a student, whether passed or failed, will be used in computation of his/her final result.

Unit Definition

Instructions and evaluations shall be by courses evaluated in terms of credit units. A credit unit is defined as one 1-hour of lecture/tutorial contact per week, or three hour of Laboratory and/or practical class per week through the semester.

Course Codes

The course codes for undergraduate courses in the department shall be three-letter abbreviation identifying the specific field of the course; e.g. MAT, CMP, BIO, etc., and numbered as follows:

Level	1st Semester	2nd Semester
100 Level	101-109	111-119
200 Level	201-209	211-299
300 Level	301-309	311-399
400 Level	401-409	411-499

STUDENT WORKLOAD/ REGISTRATION

A student shall normally be required to register for a minimum of 15 credit units and a maximum of 24 credit units during each semester, including the credit units of the required General Studies. After registration, changes in the courses shall normally be completed within two weeks after registration in any particular semester

COURSE ASSESSMENT AND EXAMINATION

Continuous Assessment

Continuous Assessment in each course shall be conducted through tests, quizzes, tutorials, assignments and reports or through other means consistent with the objectives and conduct of the course as determined by the Department. The Continuous Assessment shall constitute 40% of the full marks for the course.

Examination

There shall normally be an examination for all courses taught during a semester at the end of the semester. Each student will be credited with the number of course units assigned to each course he/she passed. A duly registered student who must have attained a minimum of 75% attendance in the course is eligible for the examination.

Regulations on Examinations

1. Only candidates that have registered and submitted their course registration forms to the Department are eligible to write examinations.
2. Candidates must arrive venue of examination 30 minutes before the take-off of an examination.
3. Candidates must come into the examination hall with their Identity Cards.
4. No programmable calculator, mobile phones, digital wrist –watch, ear piece are allowed inside the examination hall.
5. Candidates are to bring along their pens, pencils, erasers and rulers into the examination hall as borrowing of any material will not be tolerated.
6. Candidates should not bring anything that can implicate them into the examination hall (e.g. papers with pre-written answers or some jottings relating to the examination paper)
7. Candidates should check their surroundings for any implicating materials immediately they get to their seats for examinations. Such materials found should be gotten rid of before papers are distributed.

8. Candidates will not be allowed into the examination hall 30 minutes after the take – off of an examination unless the reason given by the students is reasonable, cogent and sufficiently convincing.
9. Candidates will not be allowed to stand up or go out 30 minutes to the end of an examination.
10. Candidates going out to ease his / her self during examination periods will be accompanied with an appropriate invigilator.
11. Talking, laughing, eating, smoking or discussion among candidates in the examination may warrant the invigilator(s) to send such candidates out of the examination hall.
12. A candidate who is sick on the day of an examination should notify the Level Adviser / Examination Officer at least one hour before the examination if he / she is admitted at the University Clinic and willing to write the paper.
13. Candidates must adhere strictly to the sitting arrangement made by the invigilators.
14. Candidates must write their matriculation numbers legibly with all other information, sign the answer scripts they use, write out the questions' numbers they answer at the front cover of the scripts and submit the scripts to the invigilators at the end of the examination.
15. Examination answer scripts / sheets whether used or unused should not be taken out of the examination hall by the students.
16. Failure to abide by these rules may lead a candidate to Student Disciplinary Committee (SDC).

Grading System

Student performance on a course, at all levels, will be recorded in letter grades (after due conversion from percentage scores) and grade points as follows:

Table 1: Grade Point

Letter Grade	Grade Point	Marks
A	5	70 – 100
B	4	60 – 69
C	3	50 – 59
D	2	45– 49
E	1	40 - 44
F	0	< 40

The number of grade points for each course completed by a student is computed by multiplying the number of credit units for the course by the point equivalent of the grade he/she obtained `in that course.

A student is required to obtain a minimum grade of E for each examination he takes. A student should repeat a compulsory course in which he failed to obtain a minimum pass grade so as to be used in computation of CGPA.

For a group of required courses where a student fails to pass the specified amount of units, he/she is expected to retake a number of courses to make up the required units.

At the end of each semester when the grade for all courses have been assembled, each student's cumulative grade point average is calculated by dividing total number of grade by the total number of units of all degree courses for which the student has registered.

Computation of Cumulative Grade Point Average (CGPA)

A student's standing at the end of every semester is ascertained through the Cumulative Grade Point Average (CGPA) system. This is computed by dividing the Total Weighted Grade Point (TWGP) by the Total Number of Unit (TNU) for all the courses taken (passed or failed) in the session. The TWGP is the sum of the individual course units multiplied by the grade point equivalence of the mark obtained in the course, for all the courses taken in the semester. Table 2 illustrates these.

Table 2: Calculation of CGPA

Course	Unit (U)	Grade Point (GP)	Units x Grade Point U x GP
C_1	U_1	GP_1	$U_1 \times GP_1$
C_2	U_2	GP_2	
--	--	--	--
C_i	U_i	GP_i	$U_i \times GP_i$
--	--	--	--
C_n	U_n	GP_n	$U_n \times GP_n$
TOTAL (T)	**TNU**	**TGP**	**TWGP**

$$\boldsymbol{CGPA = \frac{TWGP}{TNU}}$$

where TWGP = Total Weighted Grade Point; TNU = Total number of course units registered.

Computation of units and grades start from 100, 200 level or higher depending on the point of admission into the University, so that the cumulative grade point average at graduation is for the entire programme.

Degree Classifications

The determination of the class of degree for a student shall be based on the Cumulative Grade Point Average (CGPA) earned at the end of the programme. The CGPA shall be used in the determination of the class of degree as summarized in the Table 3. It is important to note that the CGPA shall be calculated and expressed correct to two decimal places.

Table 3: Determination of Class of Degree

Matriculation Number	**23456**
Year of Entry	2017/2018
Total Units Taken	160
Total Units Passed	140
Total Weighted Grade Point	550
Cumulative Grade Point Average	550/160 = 3.44
Class of Degree	Second Class Lower (2^2)

Table 4: Class of degree

CGPA	**Class of Degree**
4.50 & Above	First Class
3.50 – 4.49	Second Class Upper Division (2^1)
2.40 – 3.49	Second Class lower Division (2^2)
1.50 – 2.39	Third Class (3^{rd})
1.00 -- 1.49	Pass
below 1.00	No Degree

ACADEMIC STANDING

Table 5 shows the minimum standard, below which a student shall be given a written warning or be asked to withdraw from the Faculty of Science by the Senate on the recommendation of the Faculty Board.

Table 5: Academic Standing for 100 Level Entrant

Level Completed	Good Standing	Withdrawal
100	Minimum of 30 units passed	Less than 25 units
200	Minimum of 60 units passed	Less than 50 units
300	Minimum of 90 units passed	Less than 75 units

Academic Standing for 200 Level Entrant

Level completed	Good Standing	Withdrawal
200	Minimum of 20 units passed	Less than 25 units
300	Minimum of 45 units passed	Less than 50 units

Transfers, Probation and Withdrawal of Students

If a student's CGPA falls below 1.50 at the end of any year of study such a student will be placed on probation. He will be allowed to register for the course units failed as well as some course units from the next level provided his total credit load falls within the maximum allowed and provided the failed course unit is not a prerequisite to the next level course. If at the end of the probation year his cumulative grade point average still falls below 1.50, such a student will be asked to withdraw from the Department and transfer to another programme in the University suitable to his/her capacity.

A transfer student to the Department due to poor performance in another programme is not eligible for another transfer for the same reason.

A student who transfers from another programme to the Department or from another university may be credited with those course credit units earned which are relevant to the curriculum of the programme(s) in the Department.

A transfer student with advance standing will be required to spend not less than two academic sessions in the Department to be eligible for graduation.

A student who absents himself for two consecutive semesters without solid reasons may be asked to withdraw from the programme irrespective of his cumulative grade point average.

SUSPENSION OF PROGRAMME

A student for good reasons and after the approval of the Head of Department (HOD) and Senate can suspend his programme in the Department for an approved period, which shall normally not exceed one session.

GRADUATION REQUIREMENTS

The Bachelor's degree programme in Computer Science is a full time, 4-Year programme for UTME and 3-Year programme of direct entry. To receive the award of B. Sc. Degree in Computer Science, a student must pass a minimum of 120 units for the 4-Year programme or 90 units for the 3-Year direct entry programme. The units must be spread at a minimum of 30 passed credit units at each level, subject to the following regulations.

- **(a)** A minimum of 8 units must be passed among the required courses at 100 level.
- **(b)** A minimum of 15 units must be passed among the group of required courses at 200 level.
- **(c)** A minimum of 15 units must be passed among the group of required courses at 300 level in addition to the compulsory CMP 399: Industrial Training (SIWES) Programme.
- **(d)** A minimum of 12 units must be passed among the group of required courses at 400 level.
- **(e)** A minimum of 45 units must be passed from the groups of required and elective Computer Science courses at 300 and 400 levels.

DISTRIBUTION OF COURSES FOR THE B.SC. (COMPUTER SCIENCE) PROGRAMME

First Semester (100 Level)

Course Code	Course Title	Status	Unit	Pre-requisite	Contact Hours/Week		Total Workload
					Lecture	Tutorial/ Practice	
CMP 101	Introduction to Computer Science	C	3		3		3
GST 101	Use of English I	C	2		2		2
GST 112	Logic, Philosophy and Human. Existence	E	2		2		2
GST 125	Contemporary Health Issues	R	2		2		2
MAT 101	Computational Algebra	R	3		3		3
MAT 102	Calculus and Trigonometry	R	3		3		3
PHY 101	General Physics I	R	3		3		3
PHY 107	Experimental Physics I	R	1			1	1
CHM 101	General Chemistry 1	R	3		3		3
STA 101	Intro. to (Descriptive) Statistics	R	3		3		3

Second Semester (100 Level)

Course Code	Course Title	Status	Unit	Pre-requisite	Contact Hours/Week		Total Workload
					Lecture	Tutorial/ Practice	
CMP 102	Introduction to Problem Solving	C	2		2		2
GST 102	Use of English II	C	2	GST 101	2		2
GST 121	Use of Library, Study skill & ICT	C	2		2		2
STA 121	Statistical Inference	R	3		3		3
MAT 112	Analytical Geometry and Mechanics	R	3		3		3
MAT 113	Linear Algebra I	R	2		2		2
PHY 102	General Physics II	R	3		3		3
PHY 108	Experimental Physics II	R	1			1	1
PHY 103	General Physics III	E	3		3		3
STA 112	Probability I	E	3		3		3
PSY 101	Intro. to Psychology	R	2		2		2
BIO 101	General Biology I	E	3		2	1	3
CHM 102	General Chemistry II	E	3		3		

First Semester (200 Level)

Course Code	Course Title	Status	Unit	Pre-requisite	Contact Hours/Week		Total Workload
					Lecture	Tutorial/ Practice	
CMP 201	Introduction to Computer Programming	C	3		3		3
CMP 202	Introduction to Computer Networks	R	3		3		3
CMP 203	Operating System I	C	3		3		3
CMP 204	Computer Architecture and Organization I	R	3		3		3
CMP 205	Logic for Computer Science	E	3				
CMP 206	Foundations of Sequential Programming	R	3		3		3
MAT 201	Mathematical Methods	R	3		3		3
MAT 207	Introduction to Numerical Analysis	E	3		3		3
PHY 201	General Physics IV	E	3		3		3
STA 203	Statistics for Physical Science and Engineering	R	4		3	1	4
GST 207	Moral Philosophy	R	2				

Second Semester (200 Level)

Course Code	Course Title	Status	Unit	Pre-requisite	Contact Hours/Week		Total Workload
					Lecture	Tutorial/ Practice	
CMP 211	File Processing	E	3		3		
CMP 212	Computer Hardware	C	3		3		3
CMP 213	Algorithms and Complexity Analysis	R	3		3		3
CMP 214	Object-Oriented Programming	C	3				
CMP 215	Discrete Structure	R	3		3		3
CMP 216	Fundamental of Data Structure	R	3				
CMP 217	Net-Centric Computing	R	3		3		3
CMP 299	Industrial Training (12 Weeks)	C	3				
GST 214	Nigerian People and Culture	R	2		2		2
GST 211	Environment and Sustainable Development	E	2		2		2
PHY 202	Electric Circuits and Electronics	R	3		3		3
MAT 205	Linear Algebra II	E	2		2		2
MAT 202	Elementary Differential Equation I	E	3		3		3
MAT 206	Real Analysis	E	3		3		3

Note: A minimum of 15 required units of CMP courses must be passed in both semesters

First Semester (300 Level)

Course Code	Course Title	Status	Unit	Pre-requisite	Contact Hours/Week		Total Workload
					Lecture	Tutorial/ Practice	
CMP 301	Structured Programming	C	3		3		3
CMP 302	Database Design and Management	C	3		3		3
CMP 303	Operating Systems II	R	3	CMP 203	3		3
CMP 304	Computer Architecture and Organization II	C	3	CMP 204	3		3
CMP 305	Computational Science and Numerical Methods	R	3		3		3
CMP 306	System Analysis and Design	R	3		2	1	3
GST 323	Introduction to Entrepreneurship	R	2		2		2

Second Semester (300 level)

Course Code	Course Title	Status	Unit	Pre-requisite	Contact Hours/Week		Total Workload
					Lecture	Tutorial/ Practice	
CMP 311	Survey of Programming Language	C	3	CMP 301, CMP 214	3		3
CMP 312	Computer Ethics	C	3				
CMP 313	Computer and Network Security	R	3	CMP 202	3		3
CMP 314	Computer Graphics and Image processing	R	3		2	2	4
CMP 315	Compiler Construction I	R	3		3		3
CMP 399	Industrial Training II (12 Weeks)	C	3				
GST 311	Entrepreneurship	R	2		2		2
List of Elective Courses for Third Year:							
MAT 300	Abstract Algebra II	E	3		3		3
MAT 313	Geometry	E	3		3		3
MAT 317	Numerical Analysis II	E	3		3		3
STA 311	Probability III	E	3		3		3
STA 324	Linear Programming	E	3		3		3
STA 325	Laboratory for Linear programming	E	3		3		3
GST 222	Peace Studies and Conflict Resolution	E	2		2		2
GST 224	Leadership Skills	E	2		2		2

Note: A minimum of 15 required units of CMP courses must be passed in both semesters

First Semester (400 Level)

Course Code	Course Title	Status	Unit	Pre-requisite	Contact Hours/Week		Total Workload
					Lecture	Tutorial/ Practice	
CMP 401	Mobile Computing	R	3		3		3
CMP 402	Artificial Intelligence	R	3		3		3
CMP 403	Human Computer Interaction	R	2		2		2
CMP 404	Cryptography	R	2				
CMP 405	Introduction to Machine Learning	R	2				
CMP 406	Software Engineering	C	4		2	1	3

Second Semester (400 level)

Course Code	Course Title	Status	Unit	Pre-requisite	Contact Hours/Week		Total Workload
					Lecture	Tutorial/ Practice	
CMP 411	Introduction to Robotics	R	2				
CMP 414	Project Management	R	3		3		3
CMP 423	Organization of Programming Languages	R	3		3		3
CMP 424	Computer Installation and Management	R	2		2		2
CMP 425	Great Theoretical Ideas in Computer Science	R	2				
CMP 499	Final Year Project	C	6				

List of Elective Courses for Fourth Year:

Course Code	Course Title	Status	Unit	Pre-requisite	Contact Hours/Week		Total Workload
					Lecture	Tutorial/ Practice	
CMP 407	Queuing Systems	E	3		3		3
CMP 408	Computer System Performance	E	3		3		3
CMP 409	Formal Models of Computation	E	3		3		3
CMP 412	Distributed Computing System	E	3		3	1	3
CMP 413	Cloud Computing	E	2		2		2
CMP 415	Special Topics in Software Engineering	E	3		2	1	3
CMP 416	Compiler Construction II	E	3		3		3
CMP 417	Optimization Techniques	E	3		3		3
CMP 418	Information Technology Law	E	2		2		2
CMP 419	Artificial Intelligence and Games	E	3				
CMP 420	Modelling and Simulation	E	3		3		3
CMP 421	Special Topics in Computer Science	E	3		3		3
CMP 422	Quantum Computing	E	3				

Note: A minimum of 12 required units of CMP courses must be passed in both semesters

COURSE DESCRIPTION

CMP 101: Introduction to Computer Science
(3 Units: LH 30, PH: 45)
Survey of computers and information processing and their roles in society. This course introduces a historical perspective of computing, hardware, software, information systems, and human resources and explores their integration and application in business and other segments of society. Students will be required to complete lab assignments using the PC's operating system, and several commonly used applications, such as word processors, spreadsheets, presentations, graphics and other applications. Internet and on-line resources, browsers and search engines.

CMP 102: Introduction to Problem Solving
(3 Units: LH 30, PH 45)
Role of Algorithms in problem solving process, concepts and properties of Algorithms. Implementation strategies, Development of Flow Charts, Pseudo Codes. Program objects. Implementation of Algorithms in a programming Language - Visual BASIC/JAVA/C/C^{++}

CMP 201: Introduction to Computer Programming
(3 Units: LH 30, PH 45)
Introduction to problem solving methods and algorithm development, designing, coding, debugging and documenting programs using techniques of a good programming language style, programming language and programming algorithm development. A widely used programming language should be used in teaching the above.

CMP 202: Introduction to Computer Networks
(3 Units: LH 30; PH 45)
Introduction, wares, Fourier analysis, measure of communication, channel characteristics, transmission media, noise and distortion, modulation and demodulation, multiplexing, TDM FDM and FCM Parallel and serial transmission (synchronous vs asynchronous). Bus structures and loop systems, computer network Examples and design consideration, data switching principles broadcast techniques, network structure for packet switching, protocols, description of network e.g. ARPANET, etc

CMP 203: Operating System I
(3 Units: LH 30, PH 45)
Overview of O/S: Role & Purpose, Functionality Mechanisms to Support Client-server models, hand-held devices. Introduction computer processes. Multi-Programming and Multi-Processing Systems. Design Issues influences of Security, networking, multimedia, Windows O/S Principles: Structuring methods, Abstraction, processes of resources, Concept of APIS Device organization interrupts. Memory management (early system)

CMP 204: Computer Architecture I and Organization
(3 Units: **LH 45)**
Fundamental building blocks, Basic logic design, logic expression minimization, sum of product forms, product of sum. Register transfer notation, Physical considerations. Data representation, instruction formats, and number bases, Fixed and Floating point systems, representation memory systems organization and architecture. Study Architecture of an actual simple mini-computer.

CMP 205: Logic for Computer Science
(3 Units: **LH 45)**
Microprocessors and microcomputers. Logic (also called "the calculus of computer science) plays a fundamental role in computer science, similar to that played by calculus in the physical sciences and traditional engineering disciplines.

CMP 206: Foundation of Sequential Programming
(3 Units: LH 45)
Computer structure, machine language; assembly language, addressing techniques, macros, File I/O: assembler segmentation and linkage; assembler construction interpretive routines. The relationships between H/L languages and the Computer Architecture that underlies their implementation: basic machine architecture, specification and translation of P/L Block Structured Languages, parameter passing mechanisms.

CMP 211: File Processing
(3 Units: LH 45)
Introduction to data management files: and job-control language application, An overview of I/O (input/output) system architecture: logical file organizations, mapping-logical organization onto physical storage. Backup procedure, file recovery, Higher level language data management facilities Information storage & retrieval, Information management applications, Information capture and representation, analysis & indexing, search, retrieval, information privacy; integrity, security; scalability, efficiency and effectiveness.

CMP 212: Computer Hardware:
(3 Units: LH 30, PH 45)
Computer circuits; diode arrays, PIAs etc, Integrated circuits fabrication process. Use of MSI, LSI and VLSI IC' hardware Design. Primary and Secondary memories; core memory, etc. Magnetic devices; disks, tapes, video disks etc. Peripheral devices; printers, CRT's, keyboards, character recognition. Operational amplifiers; Analog-to- digital and Digital-to-analog converter.

CMP 213: Algorithms and Complexity Analysis
(3 Units: LH 45)
Basic algorithmic analysis: Asymptotic analysis of Upper and average complexity bounds; standard Complexity Classes Time and space tradeoffs in algorithms analysis recursive algorithms. Algorithmic Strategies: Fundamental computing algorithms: Numerical algorithms, sequential and binary search algorithms; sorting algorithms, Binary Search tress, Hash tables, graphs & its representation.

CMP 214: Object-Oriented Programming
(3 Units: LH 45)
Basic OOP Concepts: Classes, Objects, inheritance, polymorphism, Data Abstraction, Tools for developing, Compiling, interpreting and debugging, Java Programs, Java Syntax and data objects, operators. Central flow constructs, objects and classes programming, Arrays, methods. Exceptions, Applets and the Abstract, OLE, Persistence, Window Toolkit, Laboratory exercises in an OOP Language.

CMP 215: Discrete Structure
(3 Units: LH 45)
Basic Set Theory: Basic definitions, Relations, Equivalence Relations Partition, Ordered Sets. Boolean Algebra & Lattices, Logic, Graph theory: Directed and Undirected graphs, Graph Isomorphism, Basic Graph Theorems, Matrices; Integer and Real matrices, Boolean Matrices, Matrices med m, Path matrices. Adjacency Vectors/Matrices: Path adjacency matrix, Numerical & Boolean Adjacency matrices. Applications to counting, Discrete Probability Generating Functions.

CMP 216: Fundamentals of Data Structures
(3 Units: LH 30, PH 45)
Primitive types, Arrays, Records Strings and String processing, Data representation in memory, Stack and Heap allocation, Queues, TREES. Implementation Strategies for stack, queues, trees. Run time Storage management; Pointers and References, linked structures.

CMP 217: Net-Centric Computing
(3 Units: LH 45, PH 45)
Client/Server Computing (using the web), Building Web Applications. Topics will include: producing dynamic content using a server-based language, content serving databases and XML documents, session state management, multi-tier web-based architectures, web security, and core technologies including HTTP, HTML5, CSS, JavaScript, and SQL will be emphasized. This course will also study concepts and technologies including JavaScript libraries (e.g., jQuery), and web security. This course is hands-on and project-based; students will construct a substantial dynamic web application based on the concepts, technologies, and techniques presented during lecture.

CMP 299: Industrial Training I (3 Units)
Require 3 months of Industrial Training. Students' experience will be documented and presented in a Seminar.

CMP 301: Structured Programming
(3 Units: LH 45)
Structured Programming elements, structured design principles, abstraction modularity, stepwise refinement, structured design techniques. Principles of good programming, structured programming concepts, Debugging and testing, string processing, internal searching and sorting, recursion. Teaching of a structured programming language etc.

CMP 302: Database Design and Management
(3 Units: L H 30; P 45)
Introduction to database management systems: review of basic concepts, components of database systems DBMS functions, Database architecture and data independence use of database query language. Relational Databases: Mapping conceptual schema to relational Schema; Database Query Languages (SQL) Concept of Functional dependencies & Multi-Valued dependencies. Transaction processing; Distributed databases. Future directions in DBMS.

CMP 303: Operating System II
(3 Units: LH 45)
Issues in analyzing and designing operating systems, memory management (virtual system), name management protection, resource allocation. Concurrency: States & State diagrams Structures, Dispatching and Context Switching; interrupts; Concurrent execution; Mutual exclusion problem and some solutions Deadlock; Models and mechanisms (Semaphores, monitors etc.) Producer–Consumer Problems & Synchronization. Multiprocessor issues. Scheduling & Despatching Memory Management: Overlays, Swapping and Partitions, Paging & Segmentations Placement & replacement policies, working sets and Trashing, Caching. Pre-requisite, CMP 203

CMP 304: Computer Architecture and Organization II
(3 Units: LH 45)
Memory system, general; characteristics of memory operation. (Technology-magnetic recording semi-conductor memory, coupled devices, magnetic bubble). Memory addressing, memory hierarchy, virtual memory control systems. Hardware control, micro programmed control, Asynchronous control, i/o control. Introduction to the methodology of faulty tolerant computing. Pre-requisite, CMP 204

CMP 305: Computational Science and Numerical Methods
(3 Units: LH 45)
Operations research, Numerical Computation, Graphical computation, Modelling and simulation, High performance computation.

CMP 306: Systems Analysis and Design
(3 Units: LH 30; PH 45)
Introduction to system design. Analysis tool. Determining alternatives, physical design of computer sub-systems: physical design of manual sub-system, special of features. System Concept; System Development Life Cycle Analysis: Fact gathering Techniques, data flow diagrams, Process description data modelling. System Design: Structure Charts, form designs, security, automated Tools for design.

CMP 311: Survey of Programming Languages
(4 Units: LH 45; PH 45)
Overview of programming languages: History of programming languages, Brief survey of programming paradigms (Procedural languages, Object-oriented languages, Functional languages, Declarative – non-algorithmic languages, Scripting languages), the effects of scale on programming methodology; Language Description: Syntactic Structure (Expression notations, abstract Syntax Tree, Lexical Syntax, Grammars for Expressions, Variants of Grammars), Language Semantics (Informal semantics, Overview of formal semantics, Denotation semantics, Axiomatic semantics, Operational semantics); Declarations and types: The concept of types, Declaration models (binding, visibility, scope, and lifetime), Overview of type-checking, Garbage collection; Abstraction mechanisms: Procedures, function, and iterations as abstraction mechanisms, Parameterization mechanisms (reference vs. value), Activation records and storage management, Type parameters and parameterized types

CMP 312: Computer Ethics
(3 Units: LH 30)
This course provides a knowledge of some representative examples of the ethical issues and problems that have attracted research and scholarship in relation to the use of computing technologies. Topics covered include Computers in the Workplace, Computer Crime/cyber-attack, Privacy and Anonymity, Intellectual Property, Professional Responsibility, highly intelligent machines.

CMP 313: Computer and Network Security
(3 Units: LH 30; PH 45)
This course introduces students to the most current trends, practices and issues related to computer, network, and web security and the investigative and technical skills required by security professionals to deal with these threats. Representative topics include the following: Computer security, Network and web security, Cybercrime, application security measures, operating systems holes, Trends and issues in computer and network security, Computer forensics, The important interplay of privacy and digital rights management, Trends in malware, security for mobile devices, Ways to prevent network attacks, security policy

CMP 314: Computer Graphics and Image Processing
(2 Units: LH 30; P 45)
Hardware aspect, plotters microfilm, plotters display, graphic tablets, light pens, other graphical input aids Facsimile and its problems Refresh display refresh huggers, changing images, light pen interaction. Two and three dimensional transformation, perspective Clipping algorithms. Hidden line removal bolded surface removal. Warnock method/ algorithm, shading, data reduction for graphical input. Introduction to had writing and character recognition. Curve synthesis and fitting. Contouring. Ring structures versus doubly linked lists. Hierarchical structures. Data structure

CMP 315: Compiler Construction I
(3 Units: LH 45)
Review of compilers assemblers and interpreters, structure and functional aspects of a typical compiler, syntax semantics and, functional relationship between lexical analysis, expression analysis and code generation. Internal form of course programme. Use of a standard compiler (FORTRAN<COBOL/PL) as working vehicles. Error detection and recovery. Grammars and Languages: the parsing problem. The scanner.

CMP 399: Industrial Training II (3 Units)
Student's Industrial work experience of 3 months' duration. Students' reports will be presented in a seminar.

CMP 401: Mobile Computing
(3 Units: LH 30; PH 45)
This course provides students with an understanding of mobile computer systems particularly in the context of wireless network systems such as mobile telephony, data networks, and other platforms that use mobile devices. Students will learn how to interface hardware to mobile computing devices, and how to program those devices. Topics covered include Mobile environments and communications systems, mobile operating systems, mobile hardware devices, programming applications on mobile devices/systems, mobile system security.

CMP 402: Artificial Intelligence
(3 Units: LH 45)
Introduction to artificial intelligence, understanding natural languages, knowledge representation, expert systems: basic concepts for building experts system, Architecture of expert system constructing of expert system. Tools for building expert system seasoning about reasoning evaluate of expert system, language and tools knowledge engineering., pattern recognition, the language LISP.

CMP 403: Human-Computer Interface (HCI)
(2 Units: LH 30)
Foundations of HCI, Principles of GUI, GUI toolkits; Human-centred software evaluation and development; GUI design and programming.

CMP 404: Cryptography
(2 Units: LH 30)
Cryptography is essential for the protecting of data in computer and network systems. Topics covered include basics of cryptography, symmetric encryption, public key cryptography, hashing functions, digital signature, digital certificates, message authentication, etc

CMP 405: Introduction to Machine Learning
(2 Units: LH 30; PH 15)
Machine Learning is concerned with computer programs that learn to make better predictions or take better actions given increasing numbers of observations (e.g., programs that learn to spot high-risk medical patients, recognize human faces, recommend music and movies, or drive autonomous robots). This course covers theory and practical algorithms for machine learning from a variety of perspectives. We cover topics such as Bayesian networks, boosting, support-vector machines, dimensionality reduction, and reinforcement learning. The course also covers theoretical concepts such as bias-variance trade-off, PAC learning, margin-based generalization bounds, and Occam's Razor. Prerequisite: Fundamental Data Structures and Algorithms, Principles of Programming

CMP 406: Software Engineering
(4 Units: LH 45; PH 45)
Standards, structure, organization, project control team standards, documentation, implementation, project technical standards, project system manual. (Students gain exposure to the fundamentals of modern software engineering. This includes both core CS technical knowledge and the means by which this knowledge can be applied in the practical engineering of complex software. Topics related to software artefacts include design models, patterns, coding, static and dynamic analysis, testing and inspection, measurement, and software architecture and frameworks. Topics related to software process include modelling, requirements engineering, process models and evaluation, team development, and supply chain issues including outsourcing and open source. This course has a strong technical focus, and will include both written and programming assignments. Students will get experience with modern software engineering tools and, later in the semester, create one of their own.)

CMP 407: Queuing Systems: (3 Units: LH 45)
Introduction; Birth-death queuing systems; Markovian queues, the queue M/GI bounds, inequalities and approximations.

CMP 408: Computer System Performance Evaluation
(3 Units: LH 45)
Measurement techniques, simulation techniques; techniques, workload characterization, performance evaluation in selection problems, performance evaluation in design problems, evaluation of programme performance.

CMP 409: Automata Theory, Computability and Formal Languages (3 Units: LH 30; PH 45)
Automata theory: Roles of models in computation. Finite state Automata, Push-down Automata, Formal Grammars, Parsing, Relative powers of formal models. Regular languages, Context-free languages, Deterministic parsing of context-free languages. Recursive languages Basic computability: Turing machines, Universal Turing_Machines, Church's thesis, solvability and Decidability.

CMP 411: Introduction to Robotic
(2 Units: LH 30; PH 45)
This course introduces students to the foundations and principles of robotic manipulation. Topics include computational models of objects and motion, the mechanics of robotic manipulators, the structure of manipulator control systems, planning and programming of robot actions.

CMP 412: Distributed Computing Systems
(3 Units: LH 30; P 45)
Introduction: Definitions, Motivation; Communication Mechanisms: Communication Protocols, RPC, RMI, Stream Oriented Communication; Synchronization: Global State, Election, Distributed Mutual Exclusion, Distributed Transactions; Naming: Generic Schemes, DNS, Naming and Localization; Replication and Coherence: Consistency Models And Protocols; Fault Tolerance: Group Communication, Two-And Three-Phase Commit, Check pointing; Security: Access Control, Key Management, Cryptography; Distributed File Systems: NFS, Coda etc.

CMP 413: Cloud Computing
(2 Units: LH 30; PH 45)
This course provides an overview of cloud computing, the underlying building blocks of cloud computing and the technologies that enable it. Students will undertake hands-on tasks using appropriate cloud computing tools. Topics covered include Key Concept and Evolution of Cloud Computing, Benefits, Risks and Challenges, Economic models and SLAs, Cloud Infrastructure, Virtualization, Cloud Storage, Programming Models, Cloud Security.

CMP 414: Project Management
(3 Units: LH 30; PH 45)
Team Management, Project Scheduling, Software measurement and estimation techniques, Risk analysis, Software quality assurance, Software Configuration Management, Project Management tools.

CMP 415: Special Topics in Software Engineering
(3 Units : LH 30 ; PH 45)
Topics from process improvement ; software re-engineering configuration management; Formal specification, software cost – estimation, Software architecture, Software patterns, Software Reuse and Open source development.

CMP 416: Compiler Construction II
(3 units: LH 45)
Grammars and languages, recognizers, Top-down and bottom-up language Run-time storage Organization, The use of display in run-time storage Organization. The use of display in run time storage allocation. LR grammars and analysers. Construction of LR table. Organisation of symbol tablets. Allocation of storage to run-time variables. Code generation. Optimisation/Translator with systems.

CMP 417: Optimization Techniques
(3 Units: LH 30; PH 45)
Basic theory of optimization, use of numerical algorithms in solution of optimization problems; linear and nonlinear programming, sensitivity analysis, convexity, optimal control theory, dynamic programming, calculus of variations.

CMP 418: Information Technology Law
(2 Units: LH 30; PH 45)
Information Technology Piracy Law. Consideration is given, with case studies, to the problems of professional ethics, obligations, expectations and limitations of the IT professional. Experts are invited from industry to illuminate this vital course for students. The student is expected to submit a seminar paper of prescribed format and length

CMP 419: Artificial Intelligence and Games
(3 Units: LH 30; PH 45)
This course introduces students to the principles and practice of developing a computer game incorporating artificial intelligence techniques. Topics covered include relevant artificial intelligence techniques for game development. Throughout the course, students will use specified tools and techniques to build interactive games, incorporating intelligent behaviours into the game. Prerequisite: CMP 411 (Artificial Intelligence).

CMP 420: Modelling and Simulation
(3 Units: LH 30; PH 45)
Basic Definitions and Uses, Simulation Process, Some basic statistic Distributions Theory, Model and Simulation. Queues; Basic components, Kendal notation, Queuing rules, Little's Law, Queuing networks, Special/types of queues. Stochastic Processes; Discrete state and continuous state processes, Markov processes, Birth-Death Processes, Poisson Processes. Random Numbers; types of Random Number Exercises.

CMP 421: Special Topics in Computer Science
(3Units: LH 30; P 45)
Special topics from any area of Computer Science considered relevant at given time. Topics are expected to change from year to year. Apart from seminars to be given by lecturers and guests, students are expected to do substantial readings on their own.

CMP 422: Quantum Computing
(3 Units: LH 30; PH 45)
This course introduces students to the theory and practice of quantum computation. Key topics covered include: physics of information processing, quantum logic, quantum algorithms, quantum error correction, quantum communication, and cryptography.

CMP 423: Organisation of Programming Languages
(3 Units: LH 30; PH 45)
Language definition structure. Data types and structures, Review of basic data types, including list and trees, control structure and data flow, Rune-time consideration, interpretative languages, lexical analysis and parsing. Prerequisite – CMP 302, 303 and 305

CMP 424 Computer Installation Management
(3 Units: LH 30; PH 45)
The role of the computer centre, general operating procedures, data preparation, the magnetic tape library; operations procedure job processing procedure, security procedures, performance statistic.

CMP 425: Great Theoretical Ideas in Computer Science
(3 Units: LH 30; PH 45)
This course is about how to use theoretical ideas to formulate and solve problems in computer science. It integrates mathematical material with general problem solving techniques and Computer Science applications. Examples are drawn from Algorithms, Complexity Theory, Game Theory, Probability Theory, Graph Theory, Automata Theory, Algebra, Cryptography, and Combinatorics. Assignments involve both mathematical proofs and programming.

CMP 499: Project (6 Units: PH 270)
Students should embark on work that will lead to substantial software development under the supervision of a member of staff