Gulu University

Faculty of Science

Department of Computer Science

P.O. Box 166 Gulu

Proposed Programme Name:

Bachelor of Computer Science (Gaming and Animation Technology) (BCS-GAT) Degree Programme

Week Day Programme

March 2017

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1.0 Introduction

1.1 Gulu University

Gulu University is a Public University established in October 2002 by Statutory Instrument No. 16 of 2003. Gulu University, through its programmes, is set to make significant contributions to peace, stability, reconstruction and sustainable development.

The Vision of Gulu University is to be a leading academic Institution for the promotion of community transformation and industrialisation for sustainable development. The Mission being to expand access to higher education, provide quality professional training for delivery of appropriate social services and conduct research geared towards community transformation and conservation of biodiversity. The Vision, Mission and Goals of Gulu University are set to serve as a launch-pad for equitable and sustainable development.

The core values of Gulu University include: professionalism; integrity, effectiveness and efficiency; accountability and transparency; teamwork; gender responsiveness; concern for the elderly and people with disabilities.

The Faculty of Science was established in 2008, following the split of the former Faculty of Science Education into Faculty of Science and Faculty of Education and Humanities. The Vision and Mission of the Faculty of Science is in tandem with that of Gulu University; to play a leading role in post-war reconstruction and rehabilitation of the region through the provision of human resources in the areas of basic and applied sciences, technology, research and other services. It is also in conformity with the strategic plan of Gulu University aimed at producing high level human resource that can effectively participate in solving the social and economic problems of the country.

The Department of Computer Science is the largest of the six departments under Faculty of Science. It was established 2003 with one programme (Diploma in Computer Science). Bachelor of Science in Computer Science programme was introduced in 2005 and subsequently in 2006, Bachelors in ICT (BICT) was introduced. To-date the Department stills runs the original three programmes (Diploma, BSc. and BICT) hence the need to diversify into new programmes as demanded in the mainstream ICT industry as well as other areas where ICTs are used.

2.0 Programme Name and Corresponding Award

The name of the programme is Bachelor of Computer Science (Gaming and Animation Technology) leading to an award of Bachelor of Computer Science (Gaming and Animation Technology), abbreviated as BCS-GAT.

3.0 Programme Duration

The duration of BCS-GAT is three academic year's programme which corresponds to six semesters.

4.0 Programme Description

This degree will develop students' understanding of the principles and practices concerned with simulating active, intelligently directed environments. The programme maintains a good balance between essential theory and practice. In the theory, modules will develop students' understanding of the cognitive principles involved in user interaction with a wide range of computer games and hardware devices. In the more practical elements students will get grips with the very latest technologies in gaming and animation, and will quickly learn to combine their theoretical knowledge with a range of practical techniques to generate novel scenarios and experiences for users.

By the time a student graduates, he/she will be able to apply his/her skills in 2D and 3D digital animation to create virtual worlds of his/her own design. Crucially, these skills are no longer applicable just to games, but are increasingly valued by industry for use in teaching, marketing and modelling simulations.

5.0 Programme Rationale

Information and Communication Technologies (ICTs) have become a key factor in global development. According to Ugandan Vision 2040, ICT and ICT Enabled Services (ITES) industry has enormous opportunities that Uganda can exploit to transform the economy and peoples' lives through job creation, accelerated economic growth and significantly increased productivity thus bridging the gap between industry and the academia, and commercialization of research and development. Abel (2016). For the case of developing countries, ICTs are believed to be an enabler for sustainable development (Brown & Grant, 2010). The BCS-GAT programme is intended to create Gamming and Animation Technology (GAT) champions who combine the necessary technical and contextual competencies to deliver sustainable GAT projects. The students will acquire long-term capabilities in development and informatics to use digital technologies to transform socio-economic development. As such, the programme will prepare students to work in highly dynamic environment of GAT, including government sector, private sector, international organisations, NGOs, and global business.

6.0 Programme Goals, Objectives and Learning Outcomes

The goal of the BCS-GAT programme is to produce competent individuals who are able to initiate and implement sustainable change with rigor in developing regions and especially in Africa, using ICTs. The objectives of this programme are:

i) To build human resource capacity in GAT discipline who are able to develop computer games and animations that meet industrial, organization and society needs;
ii) To generate a pool of highly qualified candidates able to pursue research careers in GAT;
iii) To produce professionals with theoretical and practical skills in GAT in order to address the increasing demand of research and development;
iv) To promote social economic development by directing students' projects on topics of direct profession concern to them;
v) To prepare students for life-long learning.

6.1 Learning Outcomes

Upon completion of this Programme, students will be able to:

(i) Demonstrate capacity for research and development in GAT;
(ii) Initiate research ideas in GAT for further investigation at higher level of education;
(iii) Identify, conduct, present and share useful gaming and animation artefacts;
(iv) Utilize the knowledge and skills learned to identify problem and provide ICT based solutions for social economic development;
(v) Engage in other forms of academic and professional education enabled by ICTs.

7.0 Admission Requirements

Admission into the first year is through any of the three avenues, the Direct Entry Scheme, Mature Age Scheme and Diploma Holders Scheme.

7.0.1 Direct Entry Scheme

Candidates seeking admission through Direct Entry Scheme must have obtained:

1. At least two principal passes at the same sitting in UACE in any of the following subjects: Mathematics, Economics, Entrepreneurship, Physics, Chemistry, Biology, Agriculture, Technical Drawing and Food & Nutrition.

2. A minimum weighted points set by the Admissions Board of Gulu University. For purposes of computing weighted points, the advanced level subjects shall be grouped and weighted as shown in Table 1.

Table 1: Weighting scheme for advanced level subjects.

Groups	Weights	Subjects
Essentials	**3.0**	**Any two best done Essential subjects above.**
Relevant	**2.0**	**Any other best done Relevant subjects. Including Geography, Fine Art and Literature**
Desirable	**1.0**	**General Paper, Sub-Mathematics, Sub-ICT**
Others.	**0.5**	**All others**

7.0.2 Mature Age Scheme

Admission may also be via the Mature Age Entry Scheme, after the passing of two special Mature Age Entry Examinations of Gulu University, one in aptitude and the other in specialized knowledge.

7.0.3 Diploma Holders Scheme

Holders of the Uganda National Examinations Board Ordinary Technical Diploma or its equivalent can be admitted to the programme. Applicants should have obtained:

1. A Credit Class diploma with at least a Credit Pass in Mathematics.

7.1 Admission to Other Years

Admission other than to the first year of the programme shall require a special resolution of the Faculty Board and permission of the Senate. The Department will work out all appropriate Credit transfers, which shall not exceed 40% of the minimum degree Credit Units.

Persons holding Diploma in Computer Science of Gulu University with at least a second class (lower division) can be admitted to 2nd year of Bachelor of Science in Gaming and Animation Technology of Gulu University. On the recommendation of the Faculty Board a student may be exempted from courses of similar or same content done at Diploma. The scores at the Diploma for the concerned courses shall be considered.

8.0 Available and Proposed Human Resource

The programme will engage the existing human resources at Gulu University and where necessary, external academics will be recruited. The following table gives the details of available staff who will be involved in running the courses.

S/N	Name	Qualification and Awarding Institution	Area of Specialization	Status	Course Outline	Total Work Load
1	Benedict Oyo	BSc. Educ (Mak) MSc. Computer Science (Mak), PhD Information Systems (Mak)	E-learning, ICT4D, System Dynamics, Information Management, Design Science	Full-time	• Research Methodology • Project Design Workshop • Project Management	10
2	Boogere James	BSc. Educ (MUST) MSc. Computer Science (Mak)	E-learning and Algorithm Design	Full-time	• Fundamentals of Information Systems • Principles of Computer Gaming (1)	7

3	Tabo Olok Geoffrey	BSc. Education (Mak) MSc. Computer Science (Mak) PhD –Student	Information Retrieval, Problem base E-learning	Full-time	• Social Computing • Systems Analysis and Design • Game Theory	10
4	Olango Proscovia	BLIS (Mak) Masters in Information Science (ITC, The Netherlands) PhD – Finalist	Information Retrieval and Dissemination, Human Interaction Computing	Full-time	• HCI and Usability • 2D Animation and Cartooning	6
5	Oketcho Moses Machulu	BIT (India) MA Business Computing (India)	Data warehousing and Databases and Ethnic in IT	Full-Time	• Communication Skills • Virtual World Environments Applications	7
6	Okot David Pakono	BSc. Computer Science (Gulu), Msc. Wireless Networking	Wireless Security, Networking	Full Time	• Computer Maintenance and Repair • Cisco Certified Entry Networking Technician (CCENT)(Audited Course)	8
7	Okot Patrick	BSc. Computer Science and Mathematics (Mak) MSc. Information System	Databases, Embedded Systems, Geographical Information Systems and Object Oriented Programming	Full-Time	• Fundamentals of Programming • Introduction to Object Oriented Programming	8
8	Ashaba Anthony Arthur	BSc Computer Science (MUK) MSc Data	Computer Security, Networks, and Web	Full-Time	• Introduction Computer Networks • 3D Animation and Modelling	7

		Communication and Software Engineering Student (Mak) Student – Finalist	Development, Programming			
9	Guma Patterson Isdore	BSc Computer Science (Gulu University) MSc. Information Systems (Mak) Student – Finalist	Information System, System Dynamics and Information Management	Full-Time	• Basic Computer Skills • Mobile Game Programming	8
10	Abandu Jackson	BSc Computer Science (Gulu University) MSc. Information Technology (Mak)	E-health Computing and Information Technology Artificial Intelligence	Full-Time	• Introduction to Internet Programming • Discrete Mathematics	7
11	Akello Carmela	BSc Computer Science (Gulu University) MSc Information Systems (Mak) Student – Finalist	E-commerce, Information system Management	Full-Time	• Fundamental of Multimedia • E-Business Strategy	8
12	Kaye Milton	BIT (Gulu) MSc Data Communication and Software Engineering Student (Mak) – Finalist	Software Engineering, Game Development	Full-Time	• Mobile Game Programming • Digital Motion Graphics, Editing and Compositing	7
13	Aguma Boniface	Bsc. Computer Science (Gulu) MSc. Data Communication	Computer Networking, Wireless,	Full Time	• Fundamentals of Digital Image Processing • Principles of Computer Gaming (2)	7

		and Software Engineering (Mak) – Finalist	Mobile Communication and Game Development			
14	Akello Kalumera Christine	BIT Gulu University MIT (Mak) – Finalist	Speech Recognition and Animation Development	Full Time	• 3D Animation and Modelling • Games Development Portfolio	8
15	Apio Sarah Gladys	BIT (UCU) PGP	Database, Information Systems and Project Planning	Full Time	• Web Game Development • Innovation Techniques and Models	7

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9.0 Infrastructure Facilities

i) Lecture Rooms/ Computer Laboratory

The Department has four computer laboratories used for both lectures and practicals. The first computer laboratory (Lab II), measuring 18 m by 9 m, has 40 thin client computers. The second lab (Lab III) measures same as the first lab and has 40 desktop computers. The third lab (Cisco Lab) measures 20 m by 10 m and has eighty (80) thin client computers. The fourth lab, which is earmarked for this programme has 15 desktop computers and measures 10 m by 5 m.

ii) Library

The main Gulu University library will be accessible in this programme. In addition, online books and journals will be used.

10.0 Programme Regulation

10.1 Grading System

(i) Course Unit Grading

Each Course will be graded out of a maximum of 100 marks and assigned an appropriate letter grade and a grade point as follows:

Marks	Letter Grade	Grade Point	Interpretation
80-100	A	5.0	Excellent
75-79	B+	4.5	Very Good
70-74	B	4.0	Good
65-69	C+	3.5	Fairly Good
60-64	C	3.0	Fair
55-59	D+	2.5	Pass
50-54	D	2.0	Marginal Pass
0-49	F	0.0	Fail

(ii) The following additional letters will be used, where appropriate:

W: Withdraw from Course;
I: Incomplete;
P: Pass;
F: Failure.

(iii) Progression

Progression shall be regarded as normal, probationary or discontinuation as per the standard Gulu University Senate guidelines:

10.2 Pass Mark

A minimum pass grade for each course shall be 2.0 grade points.

10.3 Weighting System

The weighting unit is based on a Credit Unit (CU). A Credit Unit is one contact hour per week per semester or a series of fifteen (15) contact hours per semester. A contact hour is equal to (i) one lecture hour, or (ii) two practical hours, or (iii) two tutorial hours.

10.4 Calculation of Cumulative Grade Point Average (CGPA)

The CGPA shall be calculated as follows:

$$\text{CGPA} = \frac{\sum_{i=1}^{n} GP_i * CU_i}{\sum_{i=1}^{n} CU_i}$$

Where GPi is the Grade Point score of a particular course i; CU_i is the number of Credit Units of course i; and n is the number of courses so far done.

10.5 Minimum Graduation Load

To qualify for the award of the Bachelor of Computer Science in GAT, a candidate is required to

obtain a minimum of 75% class attendance, a CGPA of at least 2.0 from the required 130 credit units of taught courses.

10.6 Core Course

A core course is a course which is essential to a programme and gives the programme its unique features. It is offered by all the students who have registered for the programme. A core course has to be passed by every student who takes it.

10.7 Pre-Requisite Course

A pre-requisite course is a condition which must be satisfied prior to enrolling for the course in question. A pre-requisite course, therefore, is a course offered in preparation for a higher level course in the same area. A student shall not be allowed to take a higher level course unless he/she passes a pre-requisite course.

10.8 Elective Course

An elective course is a course offered in order to broaden a programme or to allow for specialization. An elective course is selected from given groups of courses of convenience of the student.

10.9 Audited Course

An audited course is a course offered by a student and whose grade point is not entered in the calculation of a GPA or CGPA. However, the GP for an audited course will be reflected in the academic transcript of the student.

10.10 Course Assessment

The course assessment shall be done by progressive assessments (like tests, assignments, group work) and final examination during the semester. The final examination may be purely written, purely practical or having a written and practical component.

(a) Each course shall be assessed on the basis of 100 total marks with proportions as follows:

- Course Work 30%
- Written Examination 70%

(b) Course work shall consist of laboratory work and progressive assessment (assignments/tests) each component assessed at 15%.

(c) For a course without laboratory work, progressive assessment shall carry 30%.

(d) A minimum of two coursework assignments and/or tests shall be required per Course.

10.11 Semester Course Load

10.11.1 Normal Semester Load

The minimum number of Credit Units per Semester shall be fifteen (15). The maximum number of Credit Units per Semester shall be twenty one (22).

10.11.2 Maximum Semester Load

The maximum number of Credit Units per Semester shall be twenty eight (28) to cater for students who have courses to retake or those who are able to complete the requirements for their respective Academic Awards in less than the stipulated minimum duration.

10.12 Board of Examiners

(a) There shall be a Board of Examiners, composed of external and internal examiners appointed by Senate on the recommendation of the Faculty Board.

(b) The Board of Examiners shall receive, consider and recommend to the Faculty Board the examination results of each candidate.

(c) The Faculty Board shall receiver, consider and recommend the results of examinations to the Senate for consideration and approval.

(d) In an emergency, the Dean may act on behalf of the Faculty Board or the Board of Examiners, but must report the action taken to the next Meeting of these Boards. In so doing the Dean shall, however, act in consultation with the relevant head of Department.

10.13 Progression

Progression of a student shall be classified as Normal, Probationary or Discontinuation.

10.13.1 Normal Progress

Normal Progress shall occur when a student has passed all the specified Courses. This occurs when a student passes each course taken with a minimum grade point (GP) of 2.0.

10.13.2 Probationary Progress

This is a warning stage and it will occur when:

(a) A student fails the Core or Compulsory Course.
(b) A student obtains the Cumulative Grade Point Average (CGPA) of less than two (2) at the end of any semester.
(c) When the Grade Point Average of a student goes up in the following semester after the student has retaken and passed the failed Courses, then the probation shall be removed.

10.13.3 Discontinuation

(a) When a student accumulates three consecutive probations based on CGPA he/she shall be discontinued.
(b) A student who has failed to obtain at least the Pass Mark (50%) during the Third Assessment in the same Course or Courses he/she had retaken shall be discontinued from his/her studies at the University.

(c) A student who has overstayed in an Academic Programme by more than Two (2) Years shall be discontinued from his/her studies at the University.

10.14 Absence from Examination

(a) If the Faculty Board found out that a student has no justifiable reason for having been absent from a Particular examination, such a student shall receive a fail (F) Grade for the Course(s) he/she had not sat the examination in. The Course(s) in which the Fail (F) Grade was/were awarded shall also account in the calculation of the CGPA.

(b) If the Faculty Board is satisfied that a student was absent from a final examination due to justifiable reason(s) such as sickness or loss of a parent/ guardian, and then a Course Grade of ABS shall be assigned to that Course(s). The student shall be permitted to retake the final examination when the Course would be next offered or at the next examination season, if the Lecturer concerned can make the appropriate arrangements for the examination.

(c) Certificate of Due Performance

A Certificate of Due Performance shall be awarded by the department to a student who has satisfied 75% of his/her programme load within a semester. A student who does not have coursework marks shall be denied Certificate of Due Performance. Only students who attain Certificates of Due Performance shall be allowed to sit the University Examinations.

10.15 Withdrawal

A student can apply to the Faculty Board for permission to withdraw from studies at any time of the semester. A student will be allowed only a maximum of two withdrawals in an Academic Programme and each withdrawal shall be a maximum of one academic year only.

10.16 Re-Taking a Course

(a) A student shall retake a Course when next offered again in order to obtain at least the Pass Mark (50%) if he/she had failed during the first assessment in the course or courses.

(b) A student who has failed to obtain at least the Pass Mark (50%) during the Second Assessment in the same Course he/she has retaken shall receive a warning.

(c) A student may retake a Course when next offered again in order to improve his/her Pass Grade(s) got at the first Assessment in the Course were low.

(d) While retaking a Course or Courses, a student shall:

i. Attend all the prescribed lectures/Tutorials/Practicals/Fieldwork in the Course.
ii. Satisfy all the requirements for the Coursework Component in the Course.
iii. Sit for the University Examinations in the Course.

(e) When a student accumulates retakes such that his/her normal load for a semester plus the retakes exceeds the maximum semester load (i.e, 28 CU), he/she will have to Stay Put and complete the retake first. It should be noted that retakes are mandatory.

(f) A final year student whose final Examination Results have already been classified by the relevant College or Faculty or School or Institute Board and has qualified for the Award of a Degree or Diploma or Certificate, shall not be permitted to retake any Course.

(g) When a student has retaken a course, the better of the two Grades he/she obtained in that Course shall be used in the computation of his/her Cumulative Grade Point Average (CGPA).

(h) Whenever a Course has been retaken, the Academic Transcript shall indicate so accordingly.

(i) A student who does not wish to retake a failed Elective Course shall be allowed to take a substitute Elective.

10.17 Conceded Pass

10.17.1 Definition of conceded pass

A conceded pass is a pass granted for a course in which a final year candidate is within five marks of a pass mark in the course assessment. The pass is conceded on the basis that the student's overall performance in other courses for the program has been sufficiently strong to counter the deficient percentage in that particular course.

10.17.2 Circumstances Potentially Warranting a Conceded Pass

The personal circumstances of a student must be taken into account, the student's performance in the course could have been adversely affected by his or her personal circumstances. The circumstances for approval of a conceded pass may include but not limited to:

i) Student illness or medical condition
ii) Family issues (family injury or illness, bereavement, etc)
iii) Commitment to participate in national sport or other activities that warrant favorable consideration.
iv) Commitment to assist with service activities.
v) Unavoidable and unexpected work commitments (e.g. relocation).
vi) Awarding conceded passes does not compromise there equipment's for accreditation of that programme by a professional body.

10.17.3 Responsibility and Procedure

a. The conceded passes are granted at the discretion of the faculty/institute body of governors. Students are not automatically entitled to the conceded passes and may not request them.
b. The board of examiners shall during the time of consideration of examination results, identify and grant students the legibility for conceded passes. A student will then be formally informed that he/she has been offered a conceded pass.

10.17.4 Eligibility for Conceded Pass

A conceded pass shall be granted under the following conditions:

a. A candidate shall be eligible for conceded pass if the final mark in the course is in the range of 45-49%, CGPA of a student will be at least 2.0.
b. A conceded pass may only be awarded if a student has attempted a paper at least three times. The better of the grades and will be used for awarding a conceded pass.
c. A conceded pass shall be discretionary and examination boards shall take into account the following;
    i) The result a student has scored, each time he/she has attempted a paper.
    ii) A student's overall academic record.
    iii) Comments from his/her lecturers e.g on his/her class attendance and participation
    iv) Whether the course is required for professional accreditation or it is necessary for a student to demonstrate professional or clinical competence as part of its assessment requirements.
d. A conceded pass shall be granted to a whole course not a particular piece of assessment.
e. Candidates granted conceded pass shall earn a credit on the basis of conceded pass "CP"

f. Only candidates in their final year of study shall be eligible for conceded pass.
g. The number of conceded pass will only be restricted to one course.
h. In case a candidate does not qualify for conceded pass as stipulated above, the existing provision in the semester regulation will guide as the case may be.

10.17.5 Recording a conceded pass in the academic transcript

A granted conceded pass will be recorded on the student's academic transcript by indicating a true percentage/grade achieved and "CP" as a grading code.

10.18 Approval of Examination Results

Approval of all examination results will be by the Faculty Board, but the results shall not be regarded as final until they are confirmed by Senate on submission of Appropriate Pass Lists to Senate.

10.19 Publication of Examination Results

The Faculty shall publish Provisional Examination Results of candidates in every examination soon after the meeting of the Faculty Examinations Committee. The Examination Results shall be arranged and published in a manner as prescribed by the Senate.

10.20 Appeals

Any student or candidate aggrieved by a decision of the Faculty Board may appeal to the Senate Examinations Committee for reversal or moderation of the decision of the Board.

10.21 Change of Course

A student may be permitted to change Elective Course(s) in an Academic Programme in order to substitute the Elective Course(s) failed. The substitute Elective Course(s) should be within the specified Elective Course(s) for that Academic Programme.

10.22 Change of Academic Programme

(a) A student may be permitted to change from one Academic Programme to another on condition that:

i. He/She had satisfied the admission requirements for the Academic Programme applied for.

ii. He/She should not have been attending lectures/tutorials and other academic activities of the Academic Programme he/she would want to change from for more than one-half of the duration of the Programme.

iii. He/She had not been previously dismissed on disciplinary grounds from the University.

(b) A student permitted to change his/her Programme may be allowed to transfer the Credits from the previous Academic Programme to the new Academic Programme, provided that the Credits being transferred are relevant to the new Academic Programme.

11.0 Knowledge Areas Covered in the Curriculum

The curriculum is based on six broad knowledge areas that make up practical and resourceful information systems. The six knowledge areas are:

(i) Digital Information Processing
(ii) Research and Development
(iii) Gaming Technology
(iv) Web and Mobile Technologies
(v) Innovations Management
(vi) Gaming and Animation Projects

The following section gives the details of courses corresponding with these knowledge areas.

Year 1, Semester 1 Programme Structure

CODE	COURSE NAME	LH	PH	TH	CH	CU
GCS 1101	Basic Computer Skills	30	60	-	60	4
GCS 1102	Discrete Mathematics	30	-	30	45	3
GCS 1103	Fundamentals of Information Systems	30	-	30	60	4
GCS 1104	Fundamentals of Programming	30	60	-	45	3
GIT 1103	Social Computing	30	-	30	45	3
COM 1101	Communication Skills	30	-	30	45	3
	Total Credit Units					**20**

Year 1, Semester 2 Programme Structure

CODE	COURSE NAME	LH	PH	TH	CH	CU
GCS 1201	Computer Maintenance and Repair	30	60		60	4
GCS 1202	Introduction to Object Oriented Programming	30	60	-	60	4
GCS 1203	Research Methodology	30	-	30	45	3
GCS 1204	Introduction to Internet Programming	30	-	30	45	3
GCS 1205	Introduction to Computer Networks	30	-	30	45	3
GBC 1201	Entrepreneurship Development	30	-	30	45	3
	Total Credit Units					**20**

Year 1 Recess Semester

CODE	COURSE NAME	LH	PH	TH	CH	CU
GAT 1301:	Embedded Systems Development	-	120	-	60	4
GCS 1302	Cisco Certified Entry Networking Technician (CCENT)(Audited Course)	45	60	-	75	5
	Recess Total					**09**

Year 2, Semester 1 Programme Structure

CODE	COURSE NAME	LH	PH	TH	CH	CU
GAT 2101	Fundamentals of Digital Image Processing	30	60		60	4
GAT 2102	Games Design and development	30	60		60	4
GAT 2103	Game Theory	30		30	45	3
GCS 2106	Databases	30	60		60	4
GCS 2104	Computer Organization and Architecture	30		30	45	3
	Total Credit Units					**19**

Year 2, Semester 2 Programme Structure

CODE	COURSE NAME	LH	PH	TH	CH	CU
GAT 2201	HCI and Usability	30		30	45	3
GAT 2202	Project Design Workshop	30	60		60	4
GCS 1206	Systems Analysis and Design	30	60		60	4
GAT 2203	Principles of Computer Gaming (1)	30	60		60	4
GAT 2204	2D Animation and Cartooning	30		30	45	3
	Total Credit Units					**19**

Year 2, Semester 2 Recess Course Structure

CODE	COURSE NAME	LH	PH	TH	CH	CU
GCS 2301	Industrial Training/Internship		150		75	5
	Recess Total					**5**

Year 3, Semester 1 Course Structure

CODE	COURSE NAME	LH	PH	TH	CH	CU
GIT 3103	Project Management	30		30	45	3
GAT 3101	Principles of Computer Gaming (2)	30	60		60	4
GAT 3102	3D Animation and Modelling	30	60		60	4
GAT 3103	Innovation Techniques and Models	30	60		60	4
Elective Courses (Any one)						
GAT 3104	Virtual World Environments Applications	30	60		60	4
GAT 3105	Fundamental of Multimedia	30	60		60	4
	Total Credit Units					**19**

Year 3, Semester 2 Programme Structure

CODE	COURSE NAME	LH	PH	TH	CH	CU
GAT 3201	Web Game Development	30	60		60	4
GBC 3207	E-Business Strategy	30		30	45	3
GCS 3203	Capstone CS Project		90	30	60	4
Elective Courses (Any Two)						
GAT3203	Games Development Portfolio	30	60		60	4
GAT3204	Mobile Game Programming	30	60		60	4
GAT3205	Digital Motion Graphics, Editing and Compositing	30	60		60	4
	Total Credit Units					**19**

Detailed Curriculum

Course Name: **Basic Computer Skills**
Course Code: GCS 1101
Year of Study: 1
Semester: 1
Contact Hours: 60
Credit Units: 4

Description:
This course follows the International Computer Driving License (ICDL) curriculum. It also introduces students to hardware and software practical skill development. In addition they will be exposed to hardware maintenance and services, computer assembly, identifying software and software installation.

Course objectives:
This course aims at:

i. Introducing students to main concepts of ICT at a general level.
ii. Introducing students to different parts of a computer.
iii. Developing students' knowledge and skills in using basic computer application (Microsoft Word, Excel, PowerPoint and Database).
iv. Enabling students to master computer assembly and repair

Course Learning Outcome

By the end of this course, students will be able to**:**

i. Demonstrate knowledge in main concepts of ICT.
ii. Demonstrate knowledge of different parts of computer
iii. Demonstrate competence in using computer applications including basic computer application (Microsoft Word, Excel, PowerPoint and Database).
iv. Demonstrate knowledge how computers are assembled and repaired.

Detailed Course Content
Concepts of ICT: 16 hours

Hardware (hardware concepts, computer performance, memory and storage, input/output devices); software (concepts of software); networks (network types, data transfer); ICT in everyday life (electronic world, communication, virtual communities, health, environ Using the

Computer and Managing Files: **14 hours**

Operating system (system setup, icons, windows); file management (files/folders, copy, move, delete, restore, searching); utilities (file compression, anti-virus); print management (printer option, Print).

Word Processing: **8 hours**

Using word processing application (working with documents, enhancing productivity); creating documents (entering text, selecting and editing); formatting (text, paragraphs, styles); objects (Create table, format table, work with graphical objects); mail merge (preparing documents for mail merge, mail merge outputs); printing (preparation for printing, check documents and print documents).

Spreadsheets: **8 hours**

Using Spreadsheet application (working with spreadsheets, enhancing productivity); cells (insert, select, edit, sort, copy, move, delete); managing worksheets (rows and columns, worksheets); formulas and functions (arithmetic formulas, functions); formatting (numbers/dates, contents, alignment, border effects); charts (create charts, editing charts); printing (setup, check, print).

Using Databases: **6 hours**

Understanding databases (key concepts, database organization, relationships, operation); using database application (working with databases, common tasks); tables (records, table design); retrieving information (main operations, queries); objects (forms); outputs (reports, data export, printing).

Presentation: **4 hours**

Using presentation application (working with presentations, enhancing productivity); developing a presentation (presentation views, slides, master slide); text (handling text, formatting, lists, tables); charts (using charts, organization charts); graphical objects (insert and manipulate charts, drawing); prepare outputs

(Preparation, check and deliver).

Web Browsing and Communication: **4 hours**

The Internet (concepts and terms, security considerations); using the Browser (basic browsing, settings, navigation, bookmarks); using the Web (forms, searching); Web options (saving files, prepare and print); electronic communication (concepts and terms, security considerations, e-mail theory); using e-mail (send an email, receiving e-mail, enhancing productivity); e-mail management (Organize, address book).

Semester Total **Hours 60 hours**

Study Materials
Computers and Laptops with a modern operating system for which the student has administrator privileges, Projector, Networking Tools, Printers, and White boards

Method of Delivery: The course will be taught by using lectures, hands-on demonstration, laboratory works, project works and assessments**.**

Method of Assessment: Assignments, tests, projects and final examination.
Their relative contributions to the final grade are: course work (assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List

1. Avgerou, C., & Discourses (2010) ICT and Development. *Information Technologies and International Development*.
2. Charles. J. (2005) A+ Training Guide Brook Fifth Edition
3. Mapping to the CompTIA A+ Objectives

Course Name: **Discrete Mathematics**
Course Code: GCS 1103
Year of Study: 1
Semester: 1
Contact Hours: 45
Credit Units: 3

Description: Introduces the foundations of discrete mathematics as they apply to computer science, focusing on providing a solid theoretical foundation for further work. Topics include functions, relations, sets, simple proof techniques, Boolean algebra, propositional logic, digital logic, elementary number theory, and the fundamentals of counting.

Prerequisites: None

Course objectives:

This course aim students at:

i) Introducing students to operations associated with sets, functions, and relations.
ii) Supporting students to learn formal methods of symbolic propositional and predicate logic.
iii) Enabling students to apply computational permutations and combinations of a set, and interpret the meaning in the context of the particular application.
iv) Supporting students to design simple circuits and algorithms using fundamental building blocks.

Course Learning Outcomes

By the end this course the student will be able to**:**

i) Perform operations associated with sets, functions, and relations;

ii) Demonstrate understanding of formal methods of symbolic propositional and predicate logic;

iii) Apply computational permutations and combinations in solving sharing and distribution problems;

iv) Describe how formal tools of symbolic logic are used in circuit and algorithm design.

Topics:

Introduction to Logic and Proofs **5 hours**

Direct proofs; proof by contradiction; Mathematical induction.

Fundamental Structures **6 hours**

Functions (surjections, injections, inverses, composition); relations (reflexivity, symmetry, transitivity, equivalence relations); sets (Venn diagrams, complements, Cartesian products, power sets); pigeonhole principle; cardinality and accountability.

Boolean Algebra **6 hours**

Boolean values; standard operations on Boolean values; De Morgan's laws.

Basic Logic **8 hours**

Propositional logic; logical connectives; truth tables; mormal forms (conjunctive and disjunctive); validity.

Digital Logic **6 hours**

Logic gates, flip-flops, counters; circuit minimization.

Elementary Number Theory **7 hours**

Factorability; properties of primes; greatest common divisors and least common multiples; Euclid's algorithm; modular arithmetic; the Chinese Remainder Theorem.

Basics of Counting **7 hours**

Counting arguments (sum and product rule, Inclusion-exclusion principle, Arithmetic and geometric progressions, Fibonacci numbers); pigeonhole principle; permutations and combinations (basic definitions, Pascal's identity, the binomial theorem); Binomial coefficients.

Semester Total **45 hours**

Study Material

White board, LCD projector and fast Internet.

Method of Delivery: The course will be taught by using lectures, hands-on demonstration, laboratory works, project works and assessments.

Method of Assessment: Assignments, tests, projects and final examination.

Their relative contributions to the final grade are: course work (assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List

1. Rosen, K.H. (2011). Discrete Mathematics and Its Applications (7th ed.). Mc Graw-Hill Education.
2. Rosen, K.H. (2011). Student's Solutions Guide to accompany Discrete Mathematics and Its Applications (7th ed.). Mc Graw-Hill Education.

Susanna, S. Epp. (2011). Discrete Mathematics with Applications (4th ed.). Boston, MA: Richard Stratton.

Course Name: **Fundamental of Programming**
Course Code: GCS 1104
Year of Study: 1
Semester: 1
Contact Hours: 60
Credit Units: 4

Description:
The course introduces the fundamental concepts of procedural programming, including data types, control structures, functions, arrays, files, and the mechanics of running, testing, and debugging. The course also offers an introduction to the historical and social context of computing and an overview of computer science as a discipline. Students should have sufficient facility with high-school mathematics to solve simple linear equations and to appreciate the use of mathematical notation and formalism.

Prerequisites: None

Course Objectives
This course will enable students to:

i) Gain knowledge in developing algorithms for solving simple problems and trace the execution of computer programs.
ii) Develop skills in constructing object-oriented, structured classes and methods.
iii) Design the language translation phases of compiling, interpreting, linking and executing, and differentiate the error conditions associated with each phase.

Course Learning Outcome
Upon completion of this course, the students will acquire knowledge that will enable them to:
i) Construct a simple program for solving simple problems and trace the execution of computer programs.
ii) Apply the program development process to problems that structured, and functional programming methodologies.
iii) Decompose a program into subtasks and use parameter passing to exchange information between the subparts.

Topics:
Fundamental Programming Constructs: 15 hours

Syntax and semantics of a higher-level language; variables, types, expressions, and assignment; simple I/O; conditional and iterative control structures; functions and parameter passing; structured decomposition.

Algorithms and Problem-Solving: **15 hours**

Problem-solving strategies; the role of algorithms in the problem solving process; implementation strategies for algorithms; debugging strategies; the concept and properties of algorithms.

Fundamental Data Structures: **10 hours**

Primitive types; arrays; records; strings and string processing.

Machine Level Representation of Data: **5 hours**

Bits, bytes, and words; numeric data representation and number bases; representation of character data.

Overview of Operating Systems: **5 hours**

The role and purpose of operating systems; simple file management.

Software Development Methodology: **5 hours**

Fundamental design concepts and principles; structured design; testing and debugging strategies; test-case design; programming environments; testing and debugging tools.

Social Context of Computing: **5 hours**

History of computing and computers; evolution of ideas and machines; social impact of computers and the Internet; professionalism, codes of ethics, and responsible conduct; copyrights, intellectual property, and software piracy.

Semester Total **60 hours**

Study Material

Laptops/desktops with a modern operating system, LCD projector, fast Internet, and smart phones.

Method of Delivery: The course will be taught by using lectures, hands-on demonstration, laboratory works, project works and assessments.

Method of Assessment: Assignments, tests, projects and final examination.

Their relative contributions to the final grade are: course work (assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List

1. Downey, A.B. (2012). How to Think Like a Computer Scientist (Java Version). Needham, MA: Green Tea Press.
2. Campbell, J., Gries, P., Montojo, J., & Wilson, G. (2013). Practical Programming: An Introduction to Computer Science Using Python 3. Dallas, Texas: Pragmatic Bookshelf.
3. Eck, D.J. (2015). Introduction to Programming Using Java (Version 7.0.1). Available at: http://math.hws.edu/javanotes/
4. Halterman, R.L. (2016). Fundamentals of C++ Programming. School of Computing Southern Adventist University. Available at: http://python.cs.southern.edu/cppbook/progcpp.pdf
5. Khalid, M. A., Hamre, T., & Rasmussen, R.W. (2007). Java Actually. A First Course in Programming. Thomson Learning.

6. Stroustrup, B. (2000). The C++ Programming Language (3rd ed.). Addison-Wesley Professional.

Course Name: **Fundamental of Information System**
Course Code: GCS 1104
Year of Study: 1
Semester: 1
Contact Hours: 45
Credit Units: 3

Description:
Today, information systems (IS) are an integral part of all business activities and careers. This course is designed to introduce students to contemporary information systems and demonstrate how these systems are used throughout global organizations. The focus of this course will be on the key components of information systems - people, software, hardware, data, and communication technologies, and how these components can be integrated and managed to create competitive advantage. Though the knowledge of how IS provides a competitive advantage students will gain an understanding of how information is used in organizations and how IT enables improvement in quality, speed, and agility. This course also provides an introduction to systems and development concepts, technology acquisition, and various types of application software that have become prevalent or are emerging in modern organizations and society.

Course objectives:

This Course aims at:

i. Defining how technology, people, and organizational components of information systems.
ii. Defining the value of information systems investments as well as learn to formulate a business case for a new information system, including estimation of both costs and benefits.
iii. Designing organizations develop and acquire information systems and technologies.
iv. Define how enterprise systems foster stronger relationships with customers and suppliers and how these systems are widely used to enforce organizational structures and processes.

Course Learning Outcome

Upon completion of this course, the students will acquire knowledge that will enable them to:
i. Evaluate the ethical concerns that information systems raise in society and the impact of information systems on crime, terrorism, and war.

ii. Apply Know how various types of information systems provide the information needed to gain business intelligence to support the decision making for the different levels and functions of the organization.
iii. Apply secure information systems resources, focusing on both human and technological safeguards.
iv. Demonstrate how organizations develop and acquire information systems and technologies.

Topics:

Information Systems Components **4 hours**

Hardware; software; data; networks; facilities; personnel; services**;**

Partners.

Information Systems in Organizations **5 hours**

Characteristics of IS professionals; IS career paths; cost/value information; quality of information; competitive advantage of information; IS and organizational strategy; value chains and networks.

Globalization **4 hours**

What is globalization? Technology enabled change; digital divide; global information systems strategies.

Value Information Systems 8 hours

How information systems enable organizational processes; making a business case for information systems; productivity paradox of information systems; investment evaluation (multi-criteria analysis, cost-benefit analysis); identifying and implementing innovations.

Information Systems Infrastructure **7 hours**

Hardware; software; collaboration and communications technologies; data and knowledge; networks; facilities; personnel; services; partnerships.

The Internet and WWW **7 hours**

E-Business (B2C, B2B); Intranets, Internet, Extranets; e-government; Web 2.0 - technologies (e.g., wikis, tags, blogs, net casts, self-publishing), new forms of collaboration (social networking, virtual teams, viral marketing, crowd-sourcing).

Securing Information Systems **4 hours**

Threats to information systems; technology-based safeguards; human based safeguards; information systems security planning and management.

Gaining Business Intelligence from IS **6 hours**

Organizational decision making, functions, and levels (executive, managerial, and operational levels; systems to support organizational functions and decision making); information and knowledge discovery (reporting systems; online analytical processing; data, text, and web mining; business analytics); application systems (executive, managerial, and operational support systems; decision support systems; functional area information systems; collaboration technologies; intelligent systems; knowledge management systems); information visualization (visual analytics; dashboards; geographic information systems).

Enterprise Wide IS **6 hours**

Enterprise resource planning; supply chain management; customer relationship management.

Developing and Acquiring IS Resources 5 hours

Systems development lifecycle; alternative development approaches; external acquisition; outsourcing; end-user development.

IS Ethics and Crimes **2 hours**

Information privacy, accuracy, property, and accessibility; computer crime; cyberwar / cyberterrorism.

Semester Total Hours **45 hours**

Study Materials

Computers and Laptops with a modern operating system, Projector and White boards

Method of Delivery: The course will be taught by using lectures, case-studies, laboratory work, class projects and assignments.

Method of Assessment: Assignments, tests, projects and final examination.
Their relative contributions to the final grade are: course work (assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List:

1. Avison. D., & Fitzgerald. G. (2011). Information Systems Development*: Methodologies, Techniques and Tools*. 4th ed., McGraw-Hill Higher Education**.**
2. Kenneth. C. (2011). Laudon and Jane P. Laudon. *Essentials of Management Information Systems*. 9th ed., Prentice Hall.
3. O'Brien. J. A., & George, M. M. (2008). Introduction to Information Systems. 14th ed., McGraw-Hill Irwin

Course Name: **Social Computing**
Course Code: GIT 1103
Year of Study: 1
Semester: 1
Contact Hours: 45
Credit Units: 3

Description:

This course introduces students to the major opportunities and challenges for creating online communities. The course attempts to examine the future of the Internet in the context of collaboration experiences that go beyond what's possible face to face. The view of people as social creatures and the context of current social platforms are also covered in this course.

Prerequisites: None

Course objectives:

This course aims at:

i) Introducing students to opportunities and challenges of online communities.
ii) Supporting student to gain understanding of values of social media platforms.
iii) Enabling students to develop mastery of social computing concepts and applications areas.
iv) Imparting knowledge in security and privacy issues in social computing.

Course Learning Outcomes

Upon completing this course the students will be able to:

i) Demonstrate understanding of opportunities and challenges of online communities.
ii) Provide analysis of the values of social media platforms.
iii) Show competence in using social media applications.
iv) Demonstrate understanding of security and privacy issues in social computing.

Topics:

Introduction to social computing	3 hours
Social studies of ICTs	3 hours
Information and collaboration in organizations	6 hours
Current trends in social computing (social network sites, blogs, wikis and resource sharing)	6 hours
Semantics in social networking	3 hours
Crowdsourcing	3 hours
Computer-mediated communication and collaborative technologies	3 hours
Social marketing and monetization of the web	6 hours
Security and privacy issues related to social computing	6 hours
Information society	3 hours
Publishing digital media content	3 hours
Semester Total Hours	**45 hours**

Study Material

Laptops/desktops with a modern operating system, LCD projector, fast Internet, and smart phones.

Method of Delivery: The course will be taught by using lectures, group and social network discussions, seminars and assignments.

Method of Assessment: Assignments, tests, class presentations and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, presentations) 30%, final examination 70%, total 100%.

Reading List

1. Dasgupta, S. (2010). Social Computing: Concepts, Methodologies, Tools, and Applications. Hershey, NY: IGI Global.
2. Ozok, A.A., & Zaphiris, P. (2013). Online Communities and Social Computing. San Diego: Springer.

Course Name: **Communication Skills**
Course Code: COM 1101
Year of Study: 1
Semester: 1
Contact Hours: 45
Credit Units: 3

Description: A widely heard theme among employers is that computer science professionals must be able to communicate effectively with colleagues and clients. Because of the importance of good communication skills in all computing careers, computer science students must sharpen their oral and writing skills in a variety of contexts; both inside and outside of computer science courses. This course introduces to the students principles of organization, development, and writing of technical documents; and instils in them skills of listening, speaking and interaction.

Prerequisites: None

Course Objectives

The purpose of this course is to:

i) Introduce students to skills of reading.

ii) Enable students develop skills of listening and speaking and interaction.

iii) Support students to gain understanding of technical, writing and documentation skills.

iv) Enable students to develop public and formal presentation skills.

Course Learning Outcome

By the end of this course students will be able to:

i) Demonstrate knowledge and skills of reading.

ii) Demonstrate understanding of listening, speaking and interaction techniques.

iii) Analyze written documents and literature.

iv) Apply public communication skills in formal presentations.

Detailed Course Content

Interpersonal Skills: 15 hours

Reading both individual and public; listening skills; speaking, interaction, and conversational skills; the concept team work; interoffice and intra-office communication; conduct of discussions and dynamics of meetings.

Writing and Documentation Skills: 15 hours

Note-taking; writing minutes; writing notice of meeting and agenda; preparing formal documents (resume, application letters, acceptance letters, resignation letters, memos, circulars, responses, letters of introduction etc); development of technical and academic documents(theses, proposals, dissertations, laboratory reports, papers, articles, abstracts).

Oral Presentation Principles: 15 hours

Visual and computer-assisted presentation; analysis and design of Web presentation; choice and use of appropriate presentation tools; organizing and presenting effective talk**.**

Semester Total **45 hours**

Study Material
White board, LCD projector and fast Internet.

Method of Delivery: The course will be taught by using lectures, hands-on demonstration, laboratory works, project works and assessments.

Method of Assessment: Assignments, tests, projects and final examination.
Their relative contributions to the final grade are: course work (assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List

1. Goh, B., Pomsagun, A., Tissier, M. Le. Dennison, W.C., Kremer, H.H., & Weichselgartner, J. (2008). Science Communication in Theory and Practice. Geesthacht, Germany: LOICZ International Project Office.
2. Jay, R. (2000). How to Write Proposals & Reports that Get Results. Financial Times Management.
3. Perkins, P.S. (2008). The Art and Science of Communication: Tools for Effective Communication in the Workplace. Wiley.
4. Skills You Need Ltd (2016). Advanced Communication Skills. ISBN: 978-1-911084-06-8.

Course Name: **Introduction to Object Oriented Programming**
Course Code: GCS 1202
Year of Study: 1
Semester: 2
Contact Hours: 60
Credit Units: 4

Description:
Introduces the concepts of object-oriented programming to students with a background in the procedural paradigm. The course begins with a review of control structures and data types with emphasis on structured data types and array processing. It then moves on to introduce the object-oriented programming paradigm, focusing on the definition and use of classes along with the fundamentals of object-oriented design. Other topics include an overview of programming language principles, simple analysis of algorithms, basic searching and sorting techniques, and an introduction to software engineering issues.

Course objectives:
This course aims at:

i. Define object oriented programming solutions for reuse, using ADTs that incorporate encapsulation, data abstraction, and information hiding.
ii. Define multiple-file or multiple-module programming solutions that use class hierarchies, inheritance, and polymorphism to reuse existing design and code.

iii. Verifying program correctness through the development of sound test plans and the implementation of comprehensive test cases.
iv. Create programming solutions that use data structures and existing libraries the execution of searching and sorting algorithms..
v. Create programming solutions that interacts with database.

Course Learning Outcome

By the end of this course the students will be able to:

i. Construct object oriented programming solutions for reuse, using ADTs that incorporate encapsulation, data abstraction, and information hiding.
ii. Construct multiple-file or multiple-module programming solutions that use class hierarchies, inheritance, and polymorphism to reuse existing design and code.
iii. Apply program correctness through the development of sound test plans and the implementation of comprehensive test cases.
iv. Analyze programming solutions that use data structures and existing libraries the execution of searching and sorting algorithms
v. Design and develop secure databases

Review of: **5 hours**
Control structures; functions; primitive data types.
Object Oriented Programming; **20 hours**
Object-oriented design; encapsulation and information hiding; separation of behavior and implementation; classes, subclasses, and inheritance; polymorphism; class hierarchies.
Fundamental Computing Algorithms: **5 hours**
Simple searching and sorting algorithms (linear and binary search, selection and insertion sort).
Fundamentals of Event-Driven Programming; **4 Hours**
Event-handling methods; event propagation; exception handling.
Introduction to Computer Graphics: **6 hours**
Using a simple graphics API.
Overview of Programming Languages: **4 hours**
History of programming languages; brief survey of programming paradigms.
Virtual Machines: **2 hours**
The concept of a virtual machine; hierarchy of virtual machines; intermediate languages.
Introduction to Language Translation: **8 hours**
Comparison of interpreters and compilers; language translation phases; machine-dependent and machine-independent aspects of translation.
Introduction to Database Systems: 10 hours
History and motivation for database systems; use of a database query language.
Software evolution: **6 hours**
Software maintenance; characteristics of maintainable software; reengineering; legacy systems; software reuse.
Semester Total Hours **60 hours**
Study Materials

Computers and Laptops with a modern operating system and JAVA software, Projector and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.
Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List

1. Allen, B. D, (2008). How to Think Like a Computer Scientist (Java Version). Olin College, Needham, Massachusetts.
2. Allen, B. D (2009). Python for Software Design: *How to Think Like a Computer Scientist*. 1st ed., Cambridge University Press.
3. Dal N, Weems. C & Headington, M (2001). Programming in C++, Second Edition. Jones and Bartlett Publishers, Inc.
4. Deitel P. J & Deitel H. M (2007). Jave How to Program. Seventh Edition. Pearson Education Inc.
5. Eck D, J (2006). Introduction to Programming Using Java, Fifth Edition.
6. Jennifer C (2009). Practical Programming: An Introduction to Computer Science Using Python (Pragmatic Programmers). 1st ed., Pragmatic Bookshelf.
7. Khalid A. Mughal, Hamre T & Rolf W. R (2007). Java Actually. A First Course in Programming. Thomson Learning.
8. Zelle, J (2003). Python Programming: An Introduction to Computer Science. Franklin, Beedle & Associates.

Course Name: **Research Methodology**
Course Code: GCS 1203
Year of Study: 1
Semester: 2
Contact Hours: 45
Credit Units: 3

Description:
This course enables students to develop methods, techniques and competencies necessary for efficient and effective research in Computer Science. A particular attention will be paid to selection, assessment and review of academic and other relevant literature. The course also provides an opportunity for students to practice critical appraisal and awareness skills, critical thinking, and develop confidence and independence in researching a given or chosen topic.

Course objectives:
The objectives of this course is to:

i. Introduces the processes, purpose and goals of literature review/ survey.
ii. Define variety of Computer Science research methodologies, and choose appropriate methodology relevant to the research issue or topic.

iii. Introduce students to appropriate tools and techniques to perform an effective and efficient academic literature search, including restricting searches, identifying, locating, retrieving and storing documents.

iv. Critically assess the relevance and impact of retrieved literature, and choose appropriate documents and citation to support the construction of own arguments.

Course Learning Outcome

By the end of this course students will be able

i. Demonstrate an ability to cite literature review.

ii. Appreciate and compare a variety of Computer Science research methodologies, and choose appropriate methodology relevant to the research issue or topic

iii. Choose appropriate tools and techniques to perform an effective and efficient academic literature search, including restricting searches, identifying, locating, retrieving and storing documents.

iv. Demonstrate an understanding of the process of synthesizing the knowledge acquired from the reviewed works

Topics:

Research Purpose and Products: 5 hours

Reasons for doing research; possible products the outcomes of research; finding and choosing research topics; evaluating research purpose and products.

Research Process: 18 hours

Research strategies; data generation methods; data analysis.

Internet Research: 4 hours

The Internet and WWW; Internet research topics; the Internet and literature review; the Internet and research strategies and methods; the Internet research, the law and ethics.

Research Ethics: 4 hours

Law and research; rights people directly involved; responsibility of an ethical researcher; design and creation projects and ethics; Internet research and ethics; evaluating research ethics.

Literature Search, Retrieval and Storage: 7 hours

Strategies and methods for effective literature search, retrieval and storage.

Appraising, Arguing and Reviewing: 3 hours

Appreciation of the process and principles of critical appraisal, construction of argument, peer reviewing.

Case Studies: 4 hours

Defining case studies; planning and conducting case studies; the Internet and case studies; examples of case studies in Computer Science; evaluating case-study based research.

Semester Total Hours 45 hours

Study Materials

Computers and Laptops with a modern operating system, Projector and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.

Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List

1. Briony, J. O (2005). Researching Information Systems and Computing. 1st ed., Sage Publications Ltd.
2. Lawrence, F. L, & Stephen J (2004). Reading and Understanding Research.

Course Name: **Introduction to Internet Programming**

Course Code: GCS 1204
Year of Study: 1
Semester: 2
Contact Hours: 60
Credit Units: 4

Description:

IT applications are increasingly web-based. Web technology has grown to include a variety of business, academic, organizational and social applications. Diverse multi-cultural and multi-lingual user communities now depend on Web technology. This course covers the design, implementation and testing of web-based applications including related software, databases, interfaces and digital media. It also covers social, ethical and security issues arising from the Web and social software.

Course objectives:

This course aims at enabling students to:

i. Define the structure of the World Wide Web as interconnected hypertext documents.
ii. Explain the importance of the HTTP protocol in Web applications.
iii. Create and validate HTML/XHTML documents.
iv. Define XML syntax and show how to display such documents in Web applications.
v. Discuss and contrast data entry and validation techniques in client-side vs. server-side programming.

Course Learning Outcome

i. Construct World Wide Web as interconnected hypertext documents.
ii. Demonstrate importance of the HTTP protocol in Web applications.
iii. Construct HTML/XHTML documents.
iv. Demonstrate an understanding of XML syntax and show how to display such documents in Web applications.
v. Different data entry and validation techniques in client-side

Topics:

HTML, XHTML and Web Site Design: 5 hours

Review of XHTML; Web pages; using images on XHTML; hyperlinks, tables, and frames; publishing your page on the Internet and search engines.

Cascading Style Sheet (CSS): 5 hours

What is CSS style?; controlling text properties with style; background and border; dimensioning and positioning of elements; other design techniques using the CSS style.

Images, Animations and Multimedia: 5 hours

Using multimedia on the Web; basic multimedia applications on the Web; embedding and controlling WMP; using plug-ins for multimedia applications.

XML and XSLT: 7 hours

Introduction to XML and XSLT; transforming XML to XHTML using XSLT; manipulating XML data with XSLT; using CSS and parser on XML documents.

Client Side Scripting with JavaScript: 5 hours

Statements; comments; variables; operators; comparisons; if/else; switch; popup boxes; functions; for loop; while loop; break loops;for ... in; events; try/catch; throw; string; date; array; boolean; math; RegExp.

Server Side Scripting with PHP: 5 hours

PHP Syntax, variables, string, operators, if/else, switch, arrays, while loops, for loops, functions, forms, GET, POST; ODBC; Simple XML.

TCP/IP: 2 hours

TCP/IP overview; TCP/IP addressing; TCP/IP protocols; TCP/IP email.

Web Media: 3 hours

Multi-media overview; sound formats; video formats; playing sounds; playing videos; windows formats; QuickTime; Real Video.

Network Management: 2 hours

Overview of the issues of network management; use of passwords and access control mechanisms; domain names and name services; issues for Internet service providers; security issues and firewalls.

Compression and Decompression: 3 hours

Analog and digital representations; overview of encoding and decoding algorithms; lossless and lossy compression.

Network Security: 3 hours

Fundamentals of cryptography; secret-key algorithms; public-key algorithms; authentication protocols; digital signatures.

Software Tools and Environments: 2 hours

Web-page development tools.

Intellectual Property: 2 hours

Foundations of intellectual property; copyrights, patents, and trade secrets; issues regarding the use of intellectual property on the web.

Semester Total Hours 45 hours

Study Materials

Computers and Laptops with working PHP Software Installed, Projector and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.

Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work
(Assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List:

1. Chris, B (200). Web Programming. J. Wiley and Sons.
2. Deitel H.M., Deitel P.J. Goldberg & A.B (2004). Internet & World Wide Web: *How to Program*. Prentice Hall.
3. Laura, L & Rafe, C (2003). Sams Teach Yourself Publishing HTML & XHTML in 21 Days. Sams.Net.
4. Lerdorf R., Tatroe K. & Maclntyre P. (2002). Programming PHP. O'Reilly.
5. Niederst, J (2001). Web Design in a Nutshell. O'Reilly and Associates Inc.
6. Thomas, A. P (2000). HTML: The Complete Reading List. OsborneMcGraw- Hill.
7. Yuen P.K. and Lau, V. (2003). Practical Web Technologies. Addison Wesley.

Course Name: **Introduction to Computer Networks**

Course Code: GCS 1205
Year of Study: 1
Semester: 2
Contact Hours: 45
Credit Units: 3

Description: Introduces the structure, implementation, and theoretical underpinnings of computer networking and the applications that have been enabled by the state-of-the-art technology. Specifically, the course will cover Introduction to Networks: dentition, advantages, types, congurations; The OSI/ISO reference model; Transmission media: magnetic media, twisted pair, coaxial, be optics; Data encoding: straight, Manchester, deferential Manchester, satellite; Digital versus Analog transmission; Modems, modulation and their standards, codes and pulse code modulation; Integrated Services Digital Networks (ISDN); Network Access Protocols; Passive versus dynamic allocation; LAN standards:802.3 (Ethernet), 802.4 (token bus), 802.5 (token ring); Computer Network security, Active and Passive Attacks; Network layer and Network layer protocols; Transport layer and Transport layer protocols.

Course objectives:
The aims of the course are:-

i. To provide a solid basis on the theoretical and practical understand of data communication networks
ii. To introduce students to standards and guidelines in computer and data communication networks
iii. To impact knowledge and skill relevant for the design, implementation and maintenance of modern computer communication networks

Course learning outcome:

On completion of this course unit, the students will be able to:

i. Show the terminology and concepts of the OSI reference model and the TCP/IP reference model and Demonstrate knowledge of wireless networking concepts
ii. Master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks;
iii. Demonstratrate contemporary issues in networking technologies and; Demonstrate knowledge of network tools.

Data Communication Concepts **8 hours**

Networks and open system standards: the OSI reference model
Network topologies and the physical layer Bus/Tree topology, ring topology, star topology
The future of data communications

Transmission Media and Transmission Technologies **7 hours**

The electrical interface Metallic media
Optical fiber media Wireless media (line-of-sight media)
Baseband and broadband transmission Transmission bandwidth (link capacity) Codes
Analog and digital signals Modulation and demodulation, modems and modem standards
Transmission impairments (distortion and noise limitations on system performance**)**

Data Transmission **6 hours**

Data compression Protocol Concepts - Media Access Control
Protocol basics MAC protocols (CSMA/CD and Token passing)

Data Security and Integrity **4 hours**

Error detection and correction Encryption and decryption
Viruses, worms, and hacking

Local Area Networks **6 hours**

LAN standards (IEEE standards 802 for LANs) Interconnecting LANs
LAN Hardware (server platforms, backup devices, LAN adapters, printers, etc.)
LAN system software, LAN application software LAN selection criteria

Metropolitan Area Networks (MANs) and Wide Area Networks (WANs) **6 hours**

Network routing Public data networks Circuit-switched data network Packet-switched data network
Internet protocol ISDN Electronic mail

Network Architecture **4 hours**

Layered approach & Hierarchical approach

Network Interconnections (Internetworking) **4 hours**

LAN-to-LAN connections and LAN-to-Host connections Repeaters, Bridges, Routers, and Gateways Interconnection utilities

Total Hours **45 hours**

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.

Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List

Bertsekas, Dimitri, and Robert G. (2012). Data Networks (5th Edition). Upper Saddle River, NJ: Prentice Hall.

Peterson & Davie (2011). Computer Networks (5th Edition). San Francisco, CA: Morgan.

Course Name: **Entrepreneurship Development**
Course Code: GBC 1201
Year of Study: 1
Semester: 2
Contact Hours: 45
Credit Units: 3

Description:

Entrepreneurship is a specialized business course designed to provide students the skills needed to effectively organize, develop, create, and manage their own business. This course is based upon the Marketing Education Framework which includes business, management, and entrepreneurship; communication and interpersonal skills; economics; and professional development foundations. Emphasis is placed on the functions of marketing: distribution, financing, marketing information management, pricing, product/ service management, promotion, and selling. Additional topics to be addressed are assessment of personal skills, the components of the free enterprise system and its place in our global economy, human relations and interpersonal skills, the importance of business ethics, and the role quality and service play in business. Students will develop a written business plan for a business of their choice.

Course objectives:

i. Appreciate the challenges of entrepreneurial actions in international context.
ii. Craft a draft business plan for future use in seeking venture capital and other supports.
iii. Familiarize themselves with classical elements of a business plan and develop skills in understanding the factors that venture capitalists look for in evaluating such plans.
iv. Critically analyze entrepreneurial ventures from historical and field literature to identify causal factors in success or failure of such ventures.

Course Learning Outcome

i. Describe strategies for nurturing or growing a business.
ii. Appreciate the levels and impart of risk taking to a business.
iii. Identify distinctive bases of sustainable competitive advantage that are essential to the success of an entrepreneurial firm.
iv. Identify and describe the major steps and requirements for starting a small-scale business.

Topics:

Entrepreneurship defined: **7 hours**

Venture, venture capitalist, and adventure; goal setting/planning; risk taking/resource management; the role demands of business; reasons for failure (internal and externals factors).

Variety in entrepreneurship: **7 hours**

Concept of "change agent" and "entrepreneurship"; a manager versus an entrepreneur; pros and cons of working for self-versus others; social ventures; profit motive versus a dream.

Characteristics of successful entrepreneurs share: **5 hours**

Growth of women entrepreneurs; factors most and least important to entrepreneurs; survey – are you an entrepreneur?

Entrepreneurial skills: **6 hours**

Seven steps to a successful venture; trying a venture; finding a mentor.

Innovation: **7 hours**

The challenges of innovation and how to encourage it; student project.

Identifying and assessing opportunity: **5 hours**

Profiling entrepreneurs; market research; student project**.**

You – the idea machine: **3 hours**

Examining the creative process; idea generation; left and right brain thinkers; student project.

Planning your venture: **5 hours**

Goal setting – vision; financial planning – costs, break-even, statements; market strategy – target market, surveys, advertising.

Semester Total Hours **45 hours**

Reading Lists:

1. Bruce, B & Duane (2007) Ireland. Entrepreneurship: Successfully Launching New Ventures. 2nd ed., Prentice-Hall.
2. Peter, F. D (2006). Innovation and Entrepreneurship. Collins Business.
3. Robert H (2006), Michael Peters and Dean Shepherd. Entrepreneurship. 7th ed., McGraw-Hill/Irwin.

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.

Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work
(Assignments, tests, projects) 30%, final examination 70%, total 100%.

Study Materials

Computers and Laptops with a modern operating system, Projector and White boards

Course Name: **Embedded System Development**
Course Code: GCS 1301
Year of Study: 2

Semester: 3
Contact Hours: 60
Credit Units: 4

Description:

This course will cover the basics of embedded system organization, system on programmable-chip technologies and real-time systems. It provides the advance knowledge required for embedded computer design and development as well as real-time operating systems. Students are introduced to software development concepts applicable to real-time and embedded systems. Particularly ARM Cortex M3 will be studied as a representative embedded processor and embedded software development is carried out for ARM Cortex CPUs. The students will be able to grasp the main principles of embedded system design and understand the concept of hardware-software co design, system on programmable chip (SoPC), real-time operating systems and scheduling techniques. Embedded system co-specification and partitioning is also introduced in the course. System C or other languages (e.g. UML, C, etc.) can be employed to present a unified view of the embedded systems. System C is introduced as a representative Co-specification language. Embedded hardware-software design and development tools (such as Altera Quartus II and SOPC builder) will be introduced.

Course Objectives:

This course aims to enable students to:

i) Define engineering concepts related to microprocessors, computer hardware and software systems to design embedded systems for real-world applications.
ii) Learn capabilities of using the technical knowledge of processor architecture, peripherals, programming, and CAD tools to design specific embedded computer systems.
iii) Use different embedded computer system simulation, modeling and prototyping tools such as SoPC builder and Quartus-II.
iv) Define the main features of the course-project and answer critical and project specific questions during project demo and oral sessions. Write project report by following a standard IEEE like format, where all the reports are evaluated based on their completeness, English, and citations.
v) Integrate circuit theory and practice in developing real-life embedded systems solutions.

Course Learning Outcomes:

At the end of this course, the successful student will be able to:

i) Apply specialized knowledge of subsystems like processor cores and other hardware/software system components to design an embedded computer system.
ii) Demonstrate understanding of processor architecture, peripherals, programming, and CAD tools to design specific embedded computer systems. Solve various challenges of embedded software system design by employing real-time system software design methodologies to test and verify embedded software system design.
iii) Use relevant tools to facilitate hardware software simulation and design of embedded computer systems.

iv) Demonstrate knowledge of project report writing following a standard IEEE like format, where all the reports are evaluated based on their completeness, English, and citations.
v) Apply circuit theory in developing real-life embedded systems solutions by following project requirements, specification, simulation, design and prototyping steps.

Course Outline:

1. Introduction to Embedded and Real time Systems	**2 Hours**
2. Introduction to Hardware Software Co-design	**4 Hours**
3. Circuit Theory	
4. Embedded SoPC (System on Programmable Chips)	**4 Hours**
5. Embedded Processors - ARM Cortex M3, NIOS-II and other CPU Cores	**2 Hours**
6. Multitasking and Real-time Scheduling Techniques	**4 Hours**
7. Pre-emptive and Non-pre-emptive Scheduling	**4 Hours**
8. ARM CPU, Cortex M3 and Multitasking Application	**6 Hours**
9. RTX – Real-time Operating System	**4 Hours**
10. Real-time Scheduling Techniques.	**4 Hours**
11. Earliest-Deadline-First (EDF) and Rate-Monotonic Scheduling.	**6 Hours**
12. Introduction to Priority Invers ion Problem and its Solutions	**6 Hours**
13. Fault-tolerant Embedded Systems	**4 Hours**
14. Hardware and Software Fault-Tolerance Techniques	**6 Hours**
15. Catching up and Review	**4 Hours**
Total	**60 Hours**

Study Materials
Computers, Laptops, LCD projector, Arduino kits and Arduino software, soldering gun, basic electronics materials and fast Internet, Networking Tools, Printers, and White boards

Reading List:
1. Evans, B. W. (2007). Arduino Programming Note Book. Available online at http://playground.arduino.cc/uploads/Main/arduino_notebook_v1-1.pdf
2. Smith, A.G. (2011). Introduction to Arduino: A piece of cake. Available online at http://www.introtoarduino.com/downloads/IntroArduinoBook.pdf

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.

Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.

Course Name: **Cisco Certified Entry Networking Technology**
Course Code: GCS 1302
Year of Study: 1
Semester: 1
Contact Hours: 60
Credit Units: 4

Description: The course will cover the course content for Cisco Certified Entry Networking Technician (CCENT) curriculum.

Course Objectives:
This course aims to support students to:
i) Learn how to install, operate and troubleshoot a small enterprise branch network, including basic network security.
ii) Acquire skills in designing basic computer networks.
iii) Develop understanding of functions of networks and security (WANs, the major devices of WANs, and configure PPP encapsulation, static and dynamic routing, PAT, and RIP routing).

Course Learning Outcome
By the end of this course, students will be able to:
i) Demonstrate understanding on how to install, operate and troubleshoot a small enterprise branch network, including basic network security.
ii) Apply networking skills in designing basic computer networks.
iii) Demonstrate understanding of functions of networks and security (WANs, the major devices of WANs, and configure PPP encapsulation, static and dynamic routing, PAT, and RIP routing).

Topics:

1. Networking Fundamentals:	8 hours
2. Connecting to a WAN:	8 hours
3. Basic Security and Wireless Concepts:	8 hours
4. Routing and Switching Fundamentals:	7 hours
5. TCP/IP and OSI Models:	10 hours
6. WAN Technologies:	8 hours
7. Operating and Configuring IOS Devices:	9 hours
8. Configuring RIPv2, Static and Default Routing:	10 hours
9. Implementing NAT and DHCP:	7 hours

10. Configuring Simple Network: 15 hours

Recess Total Hours **90 hours**

Study Materials
Computers and Laptops, Projector, Networking Tools, Printers, and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.

Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List:
1. CCENT (2013). Cisco Certified Entry Networking Technician Study Guide. Available at: https://www.b3fuerth.de/b3/home.nsf/imgref/Download_ccent_oView.pdf/$FILE/ccent_oView.pdf

Course Name: **Fundamentals of Digital Image Processing**

Course Code: GAT 2101
Year of Study: 2
Semester: 1
Contact Hours: 60
Credit Units: 4

Description:
This course introduces the fundamentals of digital image processing for senior undergraduate students. It emphasizes the general principles and techniques of image processing. Topics include digital image fundamentals, intensity transformations and spatial filtering, filtering in the frequency domain, image restoration and reconstruction, color image processing, wavelets and multi resolution processing, image compression and watermarking, morphological image processing, image segmentation, representation and description.

Course objectives:

This course aims at:

i. Introducing students to fundamental concepts and applications of digital image processing.
ii. Enabling students to perform intensity transformations and spatial filtering.
iii. Introducing students to concept filtering in the spatial and frequency domains.
iv. Developing students' knowledge and skills to perform Image restoration and reconstruction.

Course Learning Outcome

At the end of this course, the successful student will be able to:

i. Demonstrate fundamental of digital image processing.

ii. Analyze intensity transformations and spatial filtering.

iii. State the difference between spatial filtering and frequency domains.

iv. Demonstrate knowledge and skills to perform Image restoration and reconstruction.

Topics covered:

1. **Digital image fundamentals** **5 hours**
   Fundamental Steps in Digital Image Processing; Image Sampling and Quantization.
2. **Intensity transformations and spatial filtering** **6 hours**

Basic Intensity Transformation Functions and Histogram Processing; Fundamentals of Spatial Filtering.

3. **Filtering in the frequency domain** **6 hours**

The Discrete Fourier Transform (DFT) and the Basics of Filtering in the Frequency Domain; Image Smoothing and Sharpening Using Frequency Domain Filters.

1. **Image restoration and reconstruction** **5 hours**
   Noise Models; Noise reduction by spatial and frequency domain filtering.
2. **Color image processing** **6 hours**
   Color Fundamentals and Models; Color Transformations and Image Processing Techniques.
3. **Wavelets and multiresolution processing** **6 hours**
   Multiresolution Expansions and Wavelet Transforms.
4. **Image compression and watermarking** **7 hours**
   Fundamentals of data redundancy; Basic Compression Methods; Digital Image Watermarking.
5. **Morphological image processing** **8 hours**
   Erosion and Dilation, Opening and Closing; Basic Morphological Algorithms.
6. **Image segmentation** **6 hours**
   Point, Line, and Edge Detection; Thresholding and Region-Based Segmentation; Segmentation Using Morphological Watersheds.

Representation and description **5 hours**

Image Representation; Boundary and Regional Descriptors.

Semester Total **60 Hours**

Study Materials

Computers and Laptops with fully installed Adobe Photoshop for image and graphic designed as well as Adobe's Premiere for video processing, Projector, and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.

Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List

1. Gonzalez R. C., & Woods R. E., (2008) Digital Image Processing, 3rd edition, Prentice Hall, 2008.
2. Gonzalez R. C., Woods R. E., Steven L. & Eddins (2009) , Digital Image Processing Using MATLAB , 2rd edition.

Course Name: **Games Design and Development**

Course Code: GAT 2102
Year of Study: 2
Semester: 1
Contact Hours: 60
Credit Units: 4

Description:

This course covers the issues associated with design and development of computer games. Topics for this course include: overview of game development, game settings, character development, packaging games, and business concerns to game development.

Course Objective

This course aims to support students to:

i. Define the terms and principles of game design and development.
ii. Introduce programming and scripting languages to develop particular games.
iii. Define the structure and duties of the game development team.
iv. Practice animation production and creation tools.
v. Understand networking issues involved in games development.

Course Learning Outcomes

At the end of this course, the successful student will be able to:

i. Discuss the terms and principles of game design and development.
ii. Evaluate which programming and scripting languages are necessary to develop particular games.
iii. Understand different structures and duties of the game development team.
iv. Practice animation production and creation tools with ease.
v. Explain the networking issues involved in games development.

Topic:

1. Introduction to Game Development: (6 hours)

How to make a game, gaming terms and principles, planning the theme and structure-concept development, the game design and production processes

2. Parts of a Game In-depth analysis: requirements for all games: design, coding, art, audio, management, quality assurance, business concerns, budgets, licensing, promotion, technology, and game engines **(6 hours)**

3. Introduction to game design and technical design documents: (8 hours)

Defining the game, core game play (interface and controller), contextual game play and mechanics, story and character backgrounds, levels, media assets; the software development process, requirements, class diagrams (UML and dynamic modelling), architectural diagrams and meta game overviews, testing plan (unit, white box, black box, beta)

4. Introduction to concept and level design: (6 hours)

Game concepts, game settings and worlds, context and theme, storyboarding and writing narratives, pacing the plot, developing characters (art-driven versus story-driven character design), adding emotion to games, focusing on game play and the user experience, interactive elements and interfaces, audio and visual elements, review of game balance, and drawing the game map

5. Character development: 8 hours

Innovative game characters, types of players, identification with game characters, role-playing, game themes, character attributes and skills, character background, physical appearance, attitude/personality, sketching the character, and pitching character ideas

6. Technical considerations: 10 hours

non-visible requirements, technical design and planning, measuring and testing; specifying tools, languages, animation software, and processes; hardware and interface, 2D vs. 3D, pre-built code, architecture and goals, the quality assurance plan, defect tracking and testing, time estimates and measuring progress

7. Packaging games 8 hours

8. Business concerns and project management in gaming: 8 hours

Developing the business plan, financial and accounting needs, taxes, legal considerations, insurance, trademarks and contractual obligations, ethical considerations, marketing and promotion

Semester Total Hours 60 hours

Study Materials

Computers, Laptops, Projector and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.

Method of Assessment: Assignments, tests, research assignments and final examination.

Reading Lists

1. Jeannie, N. (2004). Game Development Essentials, Thompson.
2. Erik, B. (2003). Game Development and Production, Word ware Publishing.
3. Marc, S. (2004). Game Creation and Careers, New Riders Publishing.

Course Name: **Game Theory**
Course Code: GAT 2103
Year of Study: 2
Semester: 2
Credit Hours: 45
Credit Units: 3

Description: This course provides foundation for computer game development. The focus is on game development process including; prototyping, game design and game structure, development, testing, and maintenance. Other topics covered are game programming languages, APIs and libraries, and game graphic APIs

Course Learning Outcomes

This course unit enable students to:

i. Define game theory and its application areas
ii. Define the principal of game theory
iii. Define the various types of games

Course Learning Outcomes

On completion of this course unit, the students will be able to:

i. Explain game theory and its application areas
ii. Apply different game theory principal
iii. Discuss the various types of games

Topic

Overview and history of game theory **2 hours**

Representation of games including extensive form, normal form, characteristic function form, and partition function form **7 hours**

Types of games including: cooperative or non-cooperative, symmetric and asymmetric, zero-sum and non-zero-sum, simultaneous and sequential, infinitely long games, discrete and continuous games, one-player and many-player games, and metagames **7 hours**

Application areas of game theory and relationship with other theories **6 hours**

Game abbreviations **8 hours**

Game concepts: connections, complexity, and topology **7 hours**

Game design techniques and challenges **8 hours**

Semester Total **45 hours**

Study Materials
Computers, Laptops, Projector, Networking Tools, Printers, and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.
Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading Lists

1. Osborne, M.J. (2004). An introduction to game theory, Oxford University Press, ISBN 978-0-19-512895-6.
2. Rasmusen, E. (2006). Games and Information: *An Introduction to Game Theory* (4th ed.), Wiley-Blackwell, ISBN 978-1-4051-3666-2.
3. Shoham, Y, & Leyton-Brown, K. (2009). Multiagent Systems: *Algorithmic, Game-Theoretic, and Logical Foundations*, New York: Cambridge University Press, ISBN 978-0-521-89943.

Course Name: **Databases**

Course Code: GCS 2106
Year of Study: 2
Semester: 1
Contact Hours: 60
Credit Units: 4
Description:
Introduces the concepts and techniques of database systems.

Course objectives:
This course unite aim student to:

i. Define approaches to ensure that information systems can scale from the individual to the global. Identify issues of data persistence to an organization.
ii. Define basic goals, functions, models, components, applications, and social impact of database systems, categorize data models based on the types of concepts that they provide to describe the database structure that is, conceptual data model, physical data model, and representational data model.
iii. Provide modelling concepts and notation of the entity-relationship model and UML, including their use in data modelling, Prepare a relational schema from a conceptual model developed using the entity- relationship model.
iv. Define concepts of entity integrity constraint and referential integrity constraint (including definition of the concept of a foreign key).
v. Develop relational algebra operations from mathematical set theory (union, intersection, difference, and cartesian product) and the relational algebra operations developed specifically for relational databases (select (restrict), project, join, and division), set of query processing strategies and select the optimal strategy.
vi. Design functional dependency between two or more attributes that are a subset of a relation.

By the end of this course unit student should be able to

i. Explain and demonstrate the concepts of entity integrity constraint and referential integrity constraint (including definition of the concept of a foreign key).
ii. Demonstrate use of the relational algebra operations from mathematical set theory (union, intersection, difference, and cartesian product) and the relational algebra operations developed specifically for relational databases (select (restrict), project, join, and division), set of query processing strategies and select the optimal strategy.
iii. Determine the functional dependency between two or more attributes that are a subset of a relation.
iv. Describe approaches to ensure that information systems can scale from the individual to the global. Identify issues of data persistence to an organization.
v. Cite the basic goals, functions, models, components, applications, and social impact of database systems, categorize data models based on the types of concepts that they provide to describe the database structure that is, conceptual data model, physical data model, and representational data model.
vi. Describe the modelling concepts and notation of the entity-relationship model and UML, including their use in data modelling, Prepare a relational schema from a conceptual model developed using the entity- relationship model.

Topics:

Information Models and Systems **5 hours**

History and motivation for information systems; information storage and retrieval; information management applications; information capture and representation; analysis and indexing; search, retrieval, linking, navigation; information privacy, integrity, security, and preservation; scalability, efficiency, and effectiveness; concept of information assurance (data persistence, integrity).

Database Systems **5 hours**

History and motivation for database systems; components of database systems; DBMS functions; database architecture and data independence.

Data Modeling **8 hours**

Data modeling; conceptual models; object-oriented model; relational data model.

Relational Databases **10 hours**

Mapping conceptual schema to a relational schema; entity and referential integrity; relational algebra and relational calculus.

Database Query Languages **8 hours**

Overview of database languages; SQL; query optimization; 4thgeneration environments; embedding non-procedural queries in a procedural language; introduction to Object Query language.

Relational Database Design **8 hours**

Database design; functional dependency; formal forms; multivalued dependency; join dependency; representation theory.

Transaction Processing **5 hours**

Transactions; failure and recovery; concurrency control.

Distributed Databases **6 hours**

Distributed data storage; distributed query processing; distributed transaction model; concurrency control; homogeneous and heterogeneous solutions; client-server.

Physical Database Design **5 hours**

Storage and file structure; indexed files; hashed files; signature files; b-trees; files with dense index; files with variable length records; database efficiency and tuning.

Semester Total Hours **60 hours**

Study Materials

Computers and Laptops with installed MySQL Software, Projector and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.

Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading Lists:

1. Connolly, T. B, C. & Strachan, A (2004). Database Systems. *A Practical Approach to Design, Implementation and Management*.
2. Date C. J. (2003). An Introduction to Database Systems.
3. Garcia-Molina, H. Ullman J, & Widom, J (2008). Database Systems. *The Complete Book*.
4. Garcia-Molina, H. Ullman J, & Widom, J (2007). A First Course in Database Systems. 3rd ed., Prentice Hall.
5. Masri, R., El & Navathe S,.B (2007). Fundamentals of Database Systems. 5th ed., Addison Wesley.

Course Name: **Computer Organization and Architecture**

Course Code: GCS 2104
Year of Study: 2
Semester: 1
Contact Hours: 45
Credit Units: 3

Description:

Introduces students to the organization and architecture of computer systems, beginning with the standard von Neumann model and then moving forward to more recent architectural concepts.

Course Objectives:

This course unite aim student to:

i. Introduce Writing and debugging simple programs using assembly code.
ii. Explain the principles underlying the design and development of computer systems for a variety of purposes.
iii. Provide computing developments (such as compiler technology, networking, the web, multimedia, safety, security) on the architecture of computer systems.

iv. Define architectural features of a modern computer system.

Course Learning Outcome

Upon completion of this course students will have the ability to:

i. Write and debug simple programs using assembly code.
ii. Explain the principles underlying the design and development of computer systems for a variety of purposes.
iii. Trace the influences of important computing developments (such as compiler technology, networking, the web, multimedia, safety, security) on the architecture of computer systems.
iv. State the architectural features of a modern computer system.

Topics:

Digital Logic **8 hours**

Fundamental building blocks (logic gates, flip-flops, counters, registers, PLA); logic expressions, minimization, sum of product forms; register transfer notation; physical considerations (gate delays, fan-in, fan-out).

Data Representation 6 hours

Bits, bytes, and words; numeric data representation and number bases; fixed- and floating-point systems; signed and twos complement representations; representation of nonnumeric data (character codes, graphical data); representation of records and arrays.

Assembly Level Organization **7 hours**

Basic organization of the von Neumann machine; control unit; instruction fetch, decode, and execution; instruction sets and types (data manipulation, control, I/O); assembly/machine language programming; instruction formats; addressing modes; subroutine call and return mechanisms; I/O and interrupts.

Memory Systems **5 hours**

Storage systems and their technology; coding, data compression, and data integrity; memory hierarchy; main memory organization and operations; latency, cycle time, bandwidth, and interleaving; cache memories (address mapping, block size, replacement and store policy); virtual memory (page table, TLB); fault handling and reliability.

Interfacing and Communication **6 hours**

I/O fundamentals: handshaking, buffering, programmed I/O, interrupt driven I/O; interrupt structures: vectored and prioritized, interrupt acknowledgment; external storage, physical organization, and drives; buses: bus protocols, arbitration, and direct memory access **(DMA); introduction to networks; multimedia support; raid architectures.**

Functional Organization **7 hours**

Implementation of simple data paths; control unit: hardwired realization vs. micro programmed realization; instruction pipelining; introduction to instruction-level **parallelism (ILP).**

Multiprocessor and Alternative Architectures **6 hours**

Introduction to SIMD, MIMD, VLIW, EPIC; systolic architecture; interconnection networks; shared memory systems; cache coherence; memory models and memory **consistency.**

Performance Enhancements **6 hours**

RISC architecture; branch prediction; prefetching scalability.

Contemporary Architectures **3 hours**
Hand-held devices; embedded systems; trends in processor architecture.
Semester Total Hours **45 hours**

Study Materials
Computers, Laptops, Projector and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.
Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List:
1. Linda Null and Julia Lour (2006). The Essentials of Computer Organization and Architecture.
2. Patterson, D, A and Hennessy, J, L (2007). Computer Organization and Design. *The Hardware/Software Interface*. 3rd ed., Morgan Kaufmann, 2007.
3. Sivarama P. & Dandamudi (2003). Fundamentals of Computer Organization and Design. Springer.
4. Stallings W (2006). Computer Organization and Architecture: Designing for Performance.

Course Name: **HCI and Usability**
Course Code: GAT 2201
Year of Study: 2
Semester: 2
Contact Hours: 45
Credit Units: 3

Course Description:
Human computer interaction and user is centered design in the context of software engineering. Examines the fundamental principles of human computer interaction. Includes evaluating a system's usability based on well-defined criteria. Includes user and task analysis, as well as conceptual models and metaphors. The use of prototyping for evaluating design alternatives. Physical design of software user interfaces, including windows, menus, and commands.
Course Objectives
This course aim students to:

i. Define fundamental principles of HCI and user centered design.
ii. Develop software user interfaces based on defined usability criteria, using methods such as heuristic evaluation and user observation techniques
iii. Define user centered design and usability engineering principles as they design a variety of software user interfaces.
iv. Develop GUI development libraries and tools to create usable interfaces for simple windowed software applications.

Course Learning Outcome:

Upon completion of this course students will have the ability to:

i. Comprehend fundamental principles of HCI and user centered design.
ii. Evaluate software user interfaces based on defined usability criteria, using methods such as heuristic evaluation and user observation techniques
iii. Apply user centered design and usability engineering principles as they design a variety of software user interfaces.
iv. Use GUI development libraries and tools to create usable interfaces for simple windowed software applications.

HCI Foundation **10 hours**

Contexts for HCI (anything with a user interface, e.g., webpage, business applications, mobile applications, and games), Processes for user centered development, Different measures for evaluation, principles of usability testing, Physical capabilities that inform interaction design, Cognitive models that inform interaction design, Social models that inform interaction design, Principles of good design and good designers, Interfaces for differently aged population groups.

Designing Interaction **10 hours**

Principles of graphical user interfaces (GUIs), Elements of visual design, Task analysis, including qualitative aspects of generating task analytic models, Low fidelity (paper) prototyping, Quantitative evaluation , techniques, Help and documentation Handling human/system failure User interface standards.

Designing Interaction **10 hours**

Principles of graphical user interfaces (GUIs), Elements of visual design, Task analysis, including qualitative aspects of generating task analytic models, Low fidelity (paper) prototyping, Quantitative evaluation techniques, e.g., keystroke, Handling human/system failure, User interface standards

User Cantered Design and Testing **7 hours**

Approaches to, and characteristics of, the design process, Functionality and usability, Techniques for gathering requirements, Techniques and tools for the analysis and presentation of requirements, e.g., reports, personas and Prototyping techniques and tools, without users, using both qualitative and quantitative Techniques, Evaluation with users.

New Interactive Technologies **8 hours**

Choosing interaction styles and interaction techniques, Representing information to users, Approaches to design, implementation and evaluation of non-mouse interaction, Touch and multi touch interfaces, Shared, embodied, and large interfaces, New input modalities (such as sensor and location data), New Windows, e.g., iPhone, Android

Semester **45 hours**

Study Materials

Computers, Laptops, Projector and White boards

Method of Delivery: The course will be taught by using lectures, case studies, project works and assessments.
Method of Assessment: Assessments, tests, projects and final examination.

Reading list:

1. Yvonne R, & Helen S Interaction Design. *Beyond Human Computer Interaction*, 3rd.
2. http://proquest.safaribooksonline.com.proxy.its.virginia.edu//book/web development/usability/9780470665763
3. Task Cantered User Interface Design, on the Web at http://hcibib.org/tcuid ("TCUID")

Course Name: **Project Design Workshop**

Course Code: GAT 2202
Year of Study: 2
Semester: 2
Contact Hours: 45
Credit Units: 3

Description:
The aim of the programming project is to give each student the opportunity to show individual creativity and originality, apply where appropriate, knowledge and skills taught in the previous semesters, demonstrate programming and investigative skills, and learn how to undertake a project, using their project management, systems modelling and report writing skills.

Course objectives:
The main aim of this course unit is to:

i. Define programming project, specification, system design and modelling skills, planning, organisation, analysis and design methods, report presentation and documentation skills.
ii. Design project management and systems modelling techniques in the design, planning and organisation of a project.
iii. Define the design and implementation of software.
iv. Define design, implement, test, and debug simple programs in an object oriented programming language.
v. Define, implement, test, and debug programs that use large-scale AP packages.

Course Learning Outcome

By the end of course unit students should be able to:

i. Appreciate the need for the following in a programming project – specification; system design and modelling skills; planning, organisation, analysis and design methods; report presentation and documentation skills.

ii. Undertake and use project management and systems modelling techniques in the design, planning and organisation of a project.

iii. Document the design and implementation of software.

iv. Design, implement, test, and debug simple programs in an object oriented programming language.

v. Design, implement, test, and debug programs that use large-scale AP packages.

Course Outline

History & Concept Development

History of Game Project Management from engineer to producer	**5 Hours**
Concept Development describing the big idea	**6 Hours**

Documentation and SL Pre-Production

Game Design and defining the vision	**6 Hours**
Art & Sound Design giving the game shape and emotion	**4 Hours**
Production Plan bringing order to chaos	**4 Hours**
Technical Design creating the blueprint for production	**6 Hours**

Management & Production

Team Management, communication, objectivity, and leadership	**4 Hours**
External Relationships managing beyond the development team	**6 Hours**
Putting It All Together from idea to reality	**4 Hours**
Total Hours	**45 Hours**

Study Materials

Computers, Laptops, Projector, Networking Tools, Printers, and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.

Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List

Hight J & Novak J (2007) Game Development Essentials. *Game Project Management*

Course Name: **Principles of Computer Gaming 1**

Course Code: GAT 2203
Year of Study: 2
Semester: 2
Credit Hours: 60
Credit Units: 4

Description:
This course provides foundation for computer game development. The focus is on game development process including; prototyping, game design and game structure, development, testing, and maintenance. Other topics covered are game programming languages, APIs and libraries, and game graphic APIs

Course Objective

i. Define API languages for game development
ii. Learn the graphics APIs for game user interface design
iii. Define computer games interface
iv. Learn hardware requirements for game development and use

Course Learning Outcomes
On completion of this course unit, the students will be able to:

i. Explain languages for game development
ii. Discuss the graphics APIs for game user interface design
iii. Design computer games interface
iv. Explain hardware requirements for game development and use

Topics

1. **Overview and introduction to games** **6 hours**

Understand and analyse different aspects of phenomena we recognise as 'game' and play', games as dynamic systems of meaning-making, context of games as 'culture' and subculture, relationship between technology and interactivity and between 'game' and 'reality' and Situate games within the context of digital culture and the information society.

2. The game development process **6 hours**

Describe the Imagining a game and defining the way it works, Describing the elements that make up the game (conceptual, functional, artistic, and others) and Transmitting that information to the team that will build the game

1. Languages and APIs for game development **6 hours**

2. Graphics architectures and games interface design **8 hours**

3.	Game architecture	**6 hours**
4.	Creating a Window, Initializing Direct3D, and handling system messages	**4 hours**
5.	Modelling for Games	**4 hours**
6.	Rendering and displaying a scene	**6 hours**
7.	Game Engines	**6 hours**
8.	Introduction to Shader programming	**4 hours**
9.	Animation in game programming	**4 hours**
	Semester Total	**60 hours**

Study Materials
Computers, Laptops, Projector and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.
Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.
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Reading Lists

1. Osborne, M.J. (2016). An introduction to game theory, Oxford University Press, ISBN 978-0-19-512895-6.
2. Rasmusen, E. (2006). Games and Information. *An Introduction to Game Theory* (4th ed.), Wiley-Blackwell, ISBN 978-1-4051-3666-2,
3. Shoham, Y, & Leyton-Brown, K. (2009). Multiagent Systems. *Algorithmic, Game-Theoretic, and Logical Foundations*, New York: Cambridge University Press, ISBN 978-0-521-89943-7.

Course Name: **System Analysis and Design**

Course Code: GCS 1206
Year of Study: 2
Semester: 2
Contact Hours: 60
Credit Units: 4

Description: In this course is to study current strategies and techniques of systems analysis and design. The course covers managerial, behavioral, and technical components of the system's analysis and design process. Managerial and behavioral topics include system development methods (e.g., life cycle, prototyping, spiral model), systems theory, strategic planning, business process reengineering, project management, and information gathering techniques. Technical

topics include data dictionaries, entity-relationship models, use cases, class diagrams, state diagrams, sequence diagrams and other models used by the United Modeling Language (UML).

Learning objectives:

i. Provide analysis and design process as a generic approach, while being exposed to the traditional structured, RAD and other approaches.
ii. Determine and document a project management plan for information system development projects. This plan will include components that address the schedule, process, and quality of the project.
iii. Determine and specify information systems requirements and propose an information technology (IT) architecture for a real organization.
iv. Describe the phases of the system development life cycle, state at least have expected benefits from systems projects;
v. Describe how systems analysts interact with users, management, and other information systems professionals;
vi. Develop data own diagrams and decision tables and perform a feasibility study

Course learning outcome:

On completion of this course unit, the students will be able to:

i. Demonstrate phases of the system development life cycle, state at least have expected benefits from systems projects;
ii. Describe systems analysts interact with users, management, and other information systems professionals;
iii. Apply data own diagrams and decision tables and perform a feasibility study
iv. Demonstrate analysis and design process as a generic approach, while being exposed to the traditional structured, RAD and other approaches.
v. Apply and document a project management plan for information system development projects. This plan will include components that address the schedule, process, and quality of the project.
vi. Apply and specify information systems requirements and propose an information technology (IT) architecture for a real organization.

Topic:

SAD Fundamentals 16 hours Introduction to IS & types of IS, Need for SAD & role of Analyst, SDLC & use of CASE tools, Determining feasibility & mgt of SAD activities.

Information Requirements Analysis: 8 hours

Information gathering (Interactive methods, unobtrusive methods, RAD, prototyping), Determining Systems requirements (types of requirements).

The Analysis Process 11 hours

Structuring systems requirements (describing process speculations & structured decisions), Data modeling, Process modeling, and Preparing System proposals.

The Design Process **11 hours**

Designing effective output, Designing effective input (Accurate Data entry Procedures), User

Interface design, Database Design. System Implementation **9 hours**

Quality Assurance through Software Engineering (design with structured charts, testing, maintenance, auditing, Quality mgt), Implementing Information Systems (user training, conversion strategies, systems evaluation.

Project Management **8 hours**

Stages of system Development, Project planning, Estimation & Project Monitoring & Control.

Introduction to Object-oriented Systems Analysis & Design using UML **13 hours**

Semester Total Hours **60 hours**

Study Materials

Computers, Laptops and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.

Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List:

1. Kendall & Kendall (2005) Systems Analysis and Design, 6th Edition, Pearson Prentice Hall
2. Ho_er, J. A., George J. F., & Valacich ,J. S(1999) Modern Systems Analysis and Design, 2nd Edition, Addison-Wesley

Course Name: **2D Animation and Cartooning**

Course Code: GAT2204
Year of Study: 3
Semester: 1
Contact Hours: 60
Credit Units: 4

Description: This course will enable students to evaluate cartoon styles and techniques; storyboard and manage animation projects; record and synchronize dialog and sound effects; build believable repetitive motion cycles; manage backgrounds and camera movements; and publish completed cartoons. The emphasis is on creating cartoons that make the most of Flash software cartoons that feature appealing characters, convincing movement, and great sound. This course is designed for those anticipating a career in Web development or production.

Course Objectives:

The main objectives of this course are:

i. Define principles related 2D animation
ii. Introduce students use of Flash software
iii. Introduce Plan, build, and publish professional-quality Flash cartoons
iv. Define publishing and marketing of digital animations

Course learning Outcome

On completion of this course, the students will be able to:

i. Articulate principles related 2D animation
ii. Demonstrate competent use of Flash software
iii. Plan, build, and publish professional-quality Flash cartoons
iv. Explain publishing and marketing of digital animations

Topics

1. Cartoon methods and techniques	5 hours
2. Cartoon character construction	5 hours
3. Cartoon character types	5 hours
4. Flash animation tools	8 hours
5. Repetitive motion cycles	5 hours
6. Dialog and sound tracks	6 hours
7. Storyboarding	5 hours
8. Layout, style, camera moves	5 hours
9. Interactivity	5 hours
10. Animation team production	5 hours
11. Publishing, marketing and selling	6 hours
Semester Total	**60 hours**

Study Materials

Computers and Laptops with Adobe CS 5 that gives you a great control when creating rigs for 2D, Projector and White boards.

Method of Delivery: This Course will be delivered primarily through the lecture method complemented by student's group discussions. In addition, case studies will be used to enhance the students' analytical and communication skills.

Method of Assessment: Assessment will be in terms of tests and practical exercises (30%) and annual examination (70%)

Reading List

1. Fernandez, I. (2001). Macromedia animation and cartooning. New York: McGraw-Hill, ISBN 0072133236

Course Name: **Industrial Training**

Course Code: GCS 2301
Year of Study: 2
Semester: 3
Credit Hours: 60
Credit Units: 4

Description:
The Industrial Training program shall be carried out in an industrial setting. The program shall run for ten weeks during which the student is supervised by a member of the teaching staff of the department. The student prepares a report discussing the training environment, lessons learn, challenges faced and recommendations. This report has to be approved by both the training officer at the training firm and the student's supervisor and should be handed in to the said concerned parties before the beginning of the academic year.

Learning objectives:

i. Provide analysis and design process as a generic approach, while being exposed to the traditional structured, RAD and other approaches.
ii. Determine and document a project management plan for information system development projects. This plan will include components that address the schedule, process, and quality of the project.
iii. Determine and specify information systems requirements and propose an information technology (IT) architecture for a real organization.
iv. Communicate effectively with fellow workers and supervisors in issues related to projects undertaken.
v. Demonstrate and practice good working ethics and to internalize excellence.

Course learning outcome

i. Provide analysis and design process as a generic approach, while being exposed to the traditional structured, RAD and other approaches.
ii. ii. Determine and document a project management plan for information system development projects. This plan will include components that address the schedule, process, and quality of the project.
iii. iii. Determine and specify information systems requirements and propose an information technology (IT) architecture for a real organization.

iv. iv. Communicate effectively with fellow workers and supervisors in issues related to projects undertaken.
v. v. Demonstrate and practice good working ethics and to internalize excellence.

Topics:

Discipline Areas to be covered: **75 hours**

Software testing; application development; project support; database management; IT architecture; user and infrastructure support; networking; Web development; marketing; CRM systems; E-Commerce.

Recess Total Hours **75 hours**

Study Materials

Computers, Laptops, Projector, Networking Tools, Printers, and White boards

Method of Delivery: The cause will be delivered by use of case-studies, projects and report.
Method of Assessment: Projects and report. Their relative contributions to the final grade are: course work (projects, case-studies, report) 30%, final industrial training report 70%, total 100%.

Reading List

1. Carolyn, C., & Wise. (2009). The Vault Guide to Top Internships.
2. Fedorko, J & Allott, D (2006). The Intern Files: *How to Get, Keep, and Make the Most of Your Internship*.
3. Pollak, L (2007). Getting from College to Career. *90 Things to Do Be- fore You Join the Real World. Harper Paperbacks*.
4. William, D & Coplin (2009). 10 Things Employers Want You to Learn in College. *The Know-How You Need to Succeed*.

Course Name: **Project Management**

Course Code: GIT 3103
Year of Study: 3
Semester: 1
Credit Hours: 45
Credit Units: 3

Description:

This course discusses the processes, methods, techniques and tools that organizations use to manage their information systems projects. The course covers a systematic methodology for initiating, planning, executing, controlling, and closing projects. This course assumes that project management in the modern organization is a complex team-based activity, where various types of technologies (including project management software as well as software to support group collaboration) are an inherent part of the project management process. This course also

acknowledges that project management involves both the use of resources from within the firm, as well as contracted from outside the organization.

Course objectives:

The objectives of this course is to:

i. Introduce students to Initiate, specify, and prioritize information systems projects and to determine various aspects of feasibility of these projects.
ii. Define foundations of project management, including its definition, scope, and the need for project management in the modern organization.
iii. Equip the phases of the project management lifecycle, control projects through information tracking and cost and change control techniques.
iv. Understand project teams, including the fundamentals of leadership and team motivation manage project schedules with appropriate techniques and tools.
v. Define project communication, both internal to the team, and external to other project stakeholders, identify project risk, and the techniques for ensuring project risk is controlled.

Course Learning Outcome

By end of this course the students will be able to:

i. Apply foundations of project management, including its definition, scope, and the need for project management in the modern organization.

ii. Manage project execution, including monitoring project progress and managing project change, and appropriately documenting and communicating project status.
iii. Demonstrate phases of the project management lifecycle Control projects through information tracking and cost and change control techniques, construct projects, including administrative, personnel, and contractual closure.
iv. Apply mechanisms for dealing with legal issues in complex project contexts.
v. Demonstrate project communication, both internal to the team, and external to other project stakeholders, identify project risk, and the techniques for ensuring project risk is controlled.

Topics:

Introduction to project management: 3 hours

Project management terminology; project failures and project successes; unique features of IT projects; what is project management**?**

Project management lifecycle: 2 hours

What is the project management lifecycle?; project management and systems development or acquisition; project management context; technology and techniques to support the project management lifecycle; project management processes.

Managing project teams: 3 hours

What is a project team?; project team planning; motivating term members; leadership, power and conflict in project teams; managing global project teams.

Managing project communication: 3 hours

Managing project communication; enhancing team communication; using collaboration technologies to enhance team communication.

Managing project scope: 3 hours

Project initiation; project planning; how organizations choose projects; activities; developing the project charter.

Managing project scheduling: **4 hours**

What is project scheduling?; common problems in project scheduling; techniques for project scheduling.

Managing project resources: **3 hours**

What are resources?; types of resources (human, capital, time); techniques for managing resources.

Managing project quality: **3 hours**

What is project quality?; what are the threats to project quality?; how can we measure project quality?; tools for managing project quality.

Managing project risk: **6 hours**

What is project risk?; what are the threats to project risk?; tools for managing project risk.

Managing project procurement: **5 hours**

Alternatives to systems development; external acquisition; outsourcing; steps in the procurement process; managing the procurement process.

Project execution, control & closure: **5 hours**

Managing project execution; monitoring progress and managing change; documentation and communication; common problems in project execution.

Managing project control & closure: **5 hours**

Obtaining information; cost control; change control; administrative closure; personnel closure; contractual closure; project auditing.

Semester Total Hours **45 hours**

Study Materials

Computers, Laptops, Projector and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.

Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List:

1. James, C., & Donald, Y (2007). Project Management for Information System. 5th ed., Prentice-Hall.

2. Philip, W. (2003). Success in Your Project*: A Guide to Student System Development Projects*. Financial Times/Prentice-Hall.

3. Avison, D & Fitzgerald. (2006). Information Systems Development:. *Methodologies, Techniques and Tools*. 4th ed., McGraw-Hill Higher Education.

4 Hughes, B & Cotterell, M (2009). Software Project Management. 5th ed., McGraw-Hill Higher Education.

Course Name: **Principles of Computer Gaming II**

Course Code: **GAT3101**
Year of Study: 3
Semester: 1
Contact Hours: 60
Credit Units: 4

Description:
This course provides foundation for computer game development. The focus is on game development process including; prototyping, game design and game structure, development, testing, and maintenance. Other topics covered are game programming languages, APIs and libraries, and game graphic APIs

Course Objectives
The aim of this course is the enable students:

i. Learn languages for game development
ii. Define graphics APIs for game user interface design
iii. Explore computer games interface
iv. Explore hardware requirements for game development and use

Course Learning Outcomes

On completion of this course unit, the students will be able to:

1. Explain languages for game development
2. Discuss the graphics APIs for game user interface design
3. Design computer games interface
4. Explain hardware requirements for game development and use

c. Syllabus

1. Animation and Quaternions	**5 hours**
2. Realism and Believability	**5 hours**
3. Artificial Intelligence for Games	**5 hours**
4. Path Planning	**5 hours**
5. Distributed Multiplayer Games	**5 hours**
6. Networking Basics	**5 hours**
7. Socket Programming	**5 hours**
8. Storytelling	**5 hours**
9. Sound rendering	**5 hours**
10. Displays and Game Peripherals	**5 hours**
11. Software Engineering and Game Production	**6 hours**

12. Casual Games **4 hours**

Semester Total **60 hours**

Study Materials

Computers, Laptops, Projector and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.

Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List

1. Osborne, M.J. (2004). An introduction to game theory, Oxford University Press, ISBN 978-0-19-512895-6.
2. Rasmusen, E. (2006). Games and Information. *An Introduction to Game Theory* (4th ed.), Wiley-Blackwell, ISBN 978-1-4051-3666-2.
3. Shoham, Y., & Leyton-Brown, K. (2009). Multiagent Systems: Algorithmic, Game-Theoretic, and Logical Foundations.

Course Name: **3D Modelling and Animation**

Course Code: GAT 3206
Year of Study: 3
Semester: 2
Credit Hours: 60
Credit Units: 4

Description: This course focuses on 3D character design and modelling for animation. Students will be introduced to character design and modelling methods such as modelling with primitives, NURBS, polygons and subdivision surfaces. Production pipeline issues such as geometry deformation and level of detail will be emphasized.

Course Learning Outcomes

This course will enable students to:

i). Define principles related 3D animations
ii). Define competent use of Maya for modelling and animation
iii). Plan, build, and publish professional-quality animations

Course Learning Outcomes

On completion of this course, the students will be able to:

i). Articulate principles related 3D animations
ii). Demonstrate competent use of Maya for modelling and animation
iii). Plan, build, and publish professional-quality animations

Course Outline

1. Basic of Maya Interface **10 hours**
   Introduction to 3D Modelling and Animation with Maya, creating a scene, Manipulating a screen in 3D, Texturing an Object, Lighting a Scene and Rendering a Still Frame

2. Modelling and texturing a simple character with polygons **8 hours**
   Modelling with Polygon Tools, Working with Symmetry, Using Image Planes, Block Modelling, Sculpturing the Character and UV Texturing

3. Modelling and texturing a simple character with subdivision surfaces 10 **hours**
   Concepts of Modelling with Subdivision Surfaces, Subdivision Surfaces Levels, Refining Surface Components, Techniques for Texturing Subdivision Surfaces and Testing Geometry Deformation

4. Modelling and texturing a character with NURBS **7 hours**
   Introduction to NURBS topology, NURBS Modelling Tools, Attaching Surfaces and Rebuilding Surfaces

5. Designing a Humanoid and Modelling the Head **5 hours**
   Human Anatomy for Modellers, Using Distortions for Artistic Purposes, Methods and Tools

6. Modelling the Humanoid Torso and Limbs **6 hours**
   Blocking the Torso and Limbs, Shaping and Refining the Torso and Limbs, Testing Geometry Deformation
7. UV Mapping the Humanoid **5 hours**
   UV Mapping
8. Facial Expression **10 hours**
   The Anatomy of the Face (Physiognomy), Universal Haman Emotion and Their Physical Expression, Overall Workflows for Facial Expression.

   Semester Total **60 hours**

Study Materials
Computers and Laptops with Maya and Blender that provides a broad spectrum of modelling, texturing, lighting, animation and video post-processing functionality in one package, Projector and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.

Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List

1. Tereza, F. (2008). Character Modelling and Animation
2. Kundert-Gibbs J., Larkins M., Derakhshani D., & Kunzendorf E. Mastering Maya 8.5

Course Name: **Fundamental of Multimedia**

Course Code: GAT3105
Year of Study: 3
Semester: 1
Credit Hours: 60
Credit Units: 4

Course Description:
Multimedia communications is increasingly popular services in today's communication. However, it results in large amount of data to be transmitted through heterogeneous networks and devices. Some of multimedia applications require special treatment in networks and devices to yield user appreciable quality of service. For instance, mobile phone users around the world have started receiving TV programs through mobile phones. This course shall provide fundamental principles on multimedia communication systems with emphasis on video data. Students will learn video signal presentations, video systems, video compression. Students will also learn video transmission protocols, video application protocols and requirements, and video adaptation techniques.

Course Objectives
This course aim students to:
i). Define the basics of analog and digital video:
ii). Describe Video representation and transmission analyse analog and digital video signals and systems know the fundamental video processing techniques acquire the basic skill of designing video compression familiarize himself/herself with video compression standards know the basic techniques in designing video transmission systems: error control and rate control

Course learning Outcome
Upon the completion of the course, the student should be able to:
i). understand the basics of analog and digital video:
ii). Apply representation and transmission analyse analog and digital video signals and systems know the fundamental video processing techniques acquire the basic skill of designing video compression familiarize himself/herself with video compression standards know the basic techniques in designing video transmission systems: error control and rate control

Topic:
1. Elements of A multimedia system **4 Hours**

2. Basics of analog and digital video: color video formation and specification, analog TV system, video raster, digital video **5 Hours**

3. Frequency domain analysis of video signals, spatial and temporal frequency response of the human visual system. **5 Hours**

4. Scene, camera, and motion modeling, 3D motion and projected 2D motion, models for typical camera/object motions. 2D motion estimation: optical flow equation, different motion estimation methods (pel-based, block-based, mesh-based, global motion estimation, multi resolution approach) 14 **Hours**

5. Basic compression techniques: information bounds for lossless and lossy source coding, binary encoding, scalar/vector quantization **4 Hours**
6. Waveform-based coding: transform coding, predictive coding including motion compensated prediction and interpolation, block-based hybrid video coding, scalable video **4 Hours**

7. Video compression standards (H.261 and H.263, MPEG1, MPEG2, MPEG4, MPEG7). (Error control in video communications **6 Hours**

8. Multimedia Networks **4 Hours**

9. Video transport over the Internet and wireless networks **4 Hours**

10. Video adaptation techniques for mobile devices **4 Hours**

Total **60 hours**

Study Materials

Computers and Laptops with a modern operating system and Presentation software and White boards

Method of Delivery: The course will be taught by using lectures, group discussions, seminars, field works and assignments.

Method of Assessment: Assignments, tests, research assignments and final examination. Their relative contributions to the final grade are: course work (Assignments, tests, projects) 30%, final examination 70%, total 100%.

Reading List:

Rao R., Zoran, Bojkovic, S., Dragorad, A., & Milovanovic, (2002) Multimedia Communication Systems: Techniques, Standards, and Networks.

Course Name: **Virtual World Environments Applications**

Course Code: GAT33103
Year of Study: 3
Semester: 2
Credit Hours: 60
Credit Units: 4

Description

This course puts forth virtual characters as a new form of emotional artifacts. It presents the emotional relationships between humans and virtual characters as a new social phenomenon and direction for story and art. The content is organized in a way to answer the fundamental question: Are relationships between people and virtual characters somehow wrong, perverse, even dangerous or just silly? This is answered in the topics such as: Virtual friends, interactive stories and interactive art, behaviours to support emotional relationships, believable and emotional agents, and animation and behaviour architecture.

Course Object

The course prepares students to use the concept of Virtual World Environments Applications. The course objectives are to provide students with:

i. Define virtual world concepts and artificial intelligence
ii. Develop computer games that take advantage of "Eliza effect"
iii. Design IT projects with intelligent actors

Course Learning Outcome

On completion of this course, the students will be able to:

i. Apply the concept of virtual world concepts and artificial intelligence
ii. Construct different computer games that take advantage of "Eliza effect"
iii. Demonstrate IT projects with intelligent actors

Course

1. Introduction to virtual worlds and artificial intelligence	6 hours
2. Interface design technology for virtual worlds	7 hours
3. Virtual worlds processing technology	7 hours
4. Virtual friends, interactive stories, and interactive art	7 hours
5. Behaviours to support emotional relationships	7 hours
6. Believable and emotional agents	7 hours
7. Animation and behaviour architecture	5 hours
8. Interactive fiction	8 hours
9. Synthetic character design	6 hours
Semester Total	**60 hours**

Study Materials

Computers and Laptops with installed Unreal or Unity development apps, Projector and White boards

Method of Delivery: The course will be taught by using lectures, practical exercise, laboratory work, projects and assignments.
Method of Assessment: Assignments, tests, exercises and final examination. Their relative contributions to the final grade are: course work (assignments, tests, laboratory, and projects) 30%, final examination 70%, total 100%.

Reading List

1. D'Agustino, S. (2012) Immersive Environments, Augmented Realities, and Virtual Worlds: Assessing Future Trends in Education. *Assessing Future Trends in Education*
2. Perlin, K. (1995). Real-time responsive animation with personality. *IEEE Transactions on Visualization and Computer Graphics.*
3. Stern, A. (1999). AI Beyond Computer Games. *In Proceedings of the 1999 AAAI Spring Symposium, Artificial Intelligence and Computer Games*, pp. 77-80. Menlo Park: AAAI Press.

Course Name: **Innovation Techniques and Models**

Course Code: **GAT3104**
Year of Study: 3
Semester: 1
Credit Hours: 60
Credit Units: 4

Course Description: Students will learn techniques for improving the flexibility and originality of their thinking and will explore approaches used by managers and organizations to create and sustain high levels of innovation. Topics include: personal thinking Reading Lists, everyday creativity and eliminating mental blocks, creative thinking techniques, idea selection approaches, teaming techniques for creativity, conditions that promote creativity, design for interaction, disruptive technologies, and intellectual property. The course uses fun and hands-on activities to stimulate innovation.

Course Objective

This course aim students to:

i. Understand building blocks of innovation
ii. Define the processes and methods of creative problem solving: observation, definition, representation, ideation, evaluation and decision making
iii. Study creative and innovative thinking skills

Course Learning Outcome

On completion of this course unit, the students will be able to:

i. Be familiar with creative and innovative thinking styles
ii. Be familiar processes and methods of creative problem solving: observation, definition, representation, ideation, evaluation and decision making Understand risk taking, paradigm shift, and paradigm paralysis
iii. Enhance their creative and innovative thinking skills

Course Topics

Introduction **8 hours**
Making a case for creativity and Creative thinking as a skill
Valuing diversity in thinking **8 hours**
Thinking Reading Lists and Creativity styles
Setting the stage for success **8 hours**
Basic philosophy, Having a vision, Setting the right attitude, Recognizing and avoiding mental blocks, Avoiding mindsets, Risk taking, Paradigm shift and paradigm paralysis, Individual and team work

Creativity in problem solving **10 hours**
Decision and Evaluation: **10 hours**
Focused thinking framework, Six thinking hats : PMI , Ethical considerations
Design for Interaction **6 hours**
Introduction to design for interaction
Intellectual Property **10 hours**
Introduction to intellectual property: Patents, Copyrights ©, Trademarks ®, Trade Secret, Unfair Competition.
Semester Total **60 hours**

Study Materials
Computers and Laptops with a modern operating system for which the student has administrator privileges, Projector and White boards

Method of Delivery: The course will be taught by using lectures, practical exercise, laboratory work, projects and assignments.

Method of Assessment: Assignments, tests, exercises and final examination.
Their relative contributions to the final grade are: course work (assignments, tests, laboratory, and projects) 30%, final examination 70%, total 100%.

Course Name: **Web Game Development**

Course Code: **GAT 3201**
Year of Study: 3

Semester: 2
Contact Hours: 60
Credit Units: 4

This course will cover a basic understanding of the tools and development methodologies used for creating industry standard Web Games. This course will deal mostly with hands-on programming and development using the tools provided. Concepts of game state, game logic, user input, sprite animation, artificial intelligence will be taught via hands-on development. The games built will be mostly stand-alone HTML or Flash games, but a multi-player component will also be covered, including socket servers for Flash and server polling for HTML.

1. Customizing Your Workspace	**(4 Hours)**
2. HTML Basics	**(4 Hours)**
3. CSS Basics	**(4 Hours)**
4. Web Design Basics	**(6 Hours)**
5. Creating a Page Layout	**(4 Hours)**
6. Working with a Web Framework	**(4 Hours)**
7. Designing for Mobile Devices	**(4 Hours)**
8. Working with Templates	**(4 Hours)**
9. Working with Text, Lists, and Tables	**(4 Hours)**
10. Working with Images	**(4 Hours)**
11. Working with Navigation	**(6 Hours)**
12. Adding Interactivity	**(4 Hours)**
13. Working with Web Animation and Video	**(4 Hours)**
14. Publishing to the Web	**(4 Hours)**
Total	**(60 Hours)**

Study Materials

Computers and Laptops with HTML5 – JavaScript, DOM, CSS, and Canvas object. Flash Builder 4 – ActionScript, MXML Flash CS4/5 – ActionScript, the Flash Stage and tools installed, Projector and Whiteboard

Method of Delivery: The course will be taught by using lectures, practical exercise, laboratory work, projects and assignments.

Method of Assessment: Assignments, tests, exercises and final examination.
Their relative contributions to the final grade are: course work (assignments, tests, laboratory, and projects) 30%, final examination 70%, total 100%.

Reading List

1. Gustafson J.M. (2013) HTML5Web Application Development by Example Beginner's guide
2. Rex, D, S (2010) Game Design with HTMLS and Java

Course Name: **E-Business Strategy**

Course Code: **GBC 3207**
Year of Study: 3
Semester: 2
Contact Hours: 45
Credit Units: 3

Course Description: This course exposes students to the problems and methods of strategic management of large scale e-business systems. These are systems whose continuing operation and evolution is vital for the business or organisation that they serve. IT managers must ensure that systems are effective and cost-effective, that new projects give a good return, and that emerging technologies are evaluated and, where appropriate, adopted in an orderly manner. Similarly, emerging risks such as security threats must be evaluated and addressed using appropriate and cost-effective techniques.

Course Objectives

The objective of this course is to provide a foundation that prepares students to be future managers, to play leading roles and to manage e-business. The knowledge that students are expected to learn is:

i. Define the new economy and the Evolution of E-business and describe the implications of E-business.
ii. Relate ICT revolution and the information economy with the 'real new Economy'.
iii. Introduces internet redefines organizational boundaries.
iv. Define business process and types of business process innovations.
v. Introduce students to inter-organizational innovations through inter-organizational information system.
vi. Emphasize the importance of E-business and other key areas and emerging issues.

Course Learning Outcomes

Having successfully completed this module, you will be able to:

i. Apply E-business and describe the implications of E-business.
ii. Demonstrate Relate ICT revolution and the information economy with the 'real new Economy'.
iii. Describe how the internet redefines organizational boundaries.
iv. Demonstrate business process and types of business process innovations.
v. Apply inter-organizational innovations through inter-organizational information system.
vi. Describe the importance of E-business and emerging issues

Detailed Course Content

1. Technology-enabled business transformation, alignment of business and IT **(5 Hours)**

2. Approaches to strategy creation, SWOT analysis, senior management presentations **(8 Hours)**
3. IT governance, risk management, reporting structure **(8 Hours)**
4. Software economics, cost management, ROI, time to pay back, outsourcing, utility computing, business and IT metrics, dashboards and balanced scorecards **(8 Hours)**
5. Enterprise computing, middleware, business applications (ERP, SCM, CRM, CMS) **(8 Hours)**
6. The role of CIOs and consultants **(4 Hours)**
7. Advanced presentation and report writing skills for business **(4 Hours)**

Total **(45 Hours)**

Study Material

Laptops with a modern operating system for which the student has administrator privileges, a server computer, LCD projector and fast Internet.

Mode of Delivery

Lectures, tutorials and instructor-led seminars will be the main method of instruction. In addition, practical exercises for both the group and individuals will be given based on real life case studies.

Mode of Assessment

The assessment will be in form of tests (20%) and class presentations (10%) individual assignment (10%) and end of semester examinations (70%).

Reading List

1. Dave Chaffey (2014) Digital Business and E-Commerce Management 6th Edition, Prentice Hall 2014.
2. Keen and Digrius (2003) Making Technology Investments Profitable, Wiley.
3. Jelassi T, Enders A, FT (2014) Strategies for E-Business, Prentice Hall/Pearson Education.

Reynolds J, Oxford (2010), E-Business: a management perspective.

Course Name: **Capstone CS Project**

Course Code: GCS 3203
Year of Study: 3

Semester: 2
Credit Hours: 60
Credit Units: 4

Description:
The senior capstone CS project covers project proposal writing, feasibility studies, intellectual property, teamwork, budgets, schedule management; professional communications (reports and presentations), design, implementation, testing. The course gives students the opportunity to show individual creativity and originality, to apply where appropriate knowledge and skills taught throughout CS programme, and to demonstrate investigative, problem-solving and other transferable skills.
Prerequisites: All courses in the previous Semesters relevant for successful completion.

Course Objectives
This course aim students to:

i. Introduce to the existing and background work relevant to the project.
ii. Use appropriate experimental techniques and validation methods in developing solutions.
iii. Critically evaluate solutions and findings resulting from the project.
iv. Plan, organize and implement tasks within time constraints.
v. Work independently under the project supervisor's direction.
vi. Report, present and document the findings and deliverables resulting from the project.

Course Learning Outcome:
On completion of this course unit, the students will be able to:

i. Apply existing and background work relevant to the project.
ii. Demonstrate the elements of a successful experimental techniques and validation methods in developing solutions.
iii. Show a detailed plan, organize and implement tasks within time constraints.
iv. Demonstrate an in-depth understanding of the technology and methodology used in the project.
v. Apply appropriate theory and technology to solving specific computing science problems.
vi. Develop a report, present and document the findings and deliverables resulting from the project.

Course Outline

Capstone Project Coverage: 60 hours
The Background of study is to become aware of current developments in the area of activity related to the project and development of some tangible piece of software, hardware, system design or theoretical result. This need not necessarily be a usable finished project. Instead it could be, for example, an extension to an existing system, or a prototype built as part of a feasibility study. Deliverables do not necessarily have to be programs. They could be in non-executable form, for example, an SSM conceptual model
.
Semester Total Hours 60 hours

Study Materials
Computers, Laptops, Projector and White boards

Method of Assessment: Interim presentations, final project report and project viva. Their relative contributions to the final grade are: course work (interim presentations) 30%, final project reports and project viva 70%, total 100%.

Reading List:
1. Christian, D. (2015). Projects in Computing and Information *Systems: A Student's Guide*. 3nd , Addison Wesley.
2. Christian, D. (2000). The Essence of Computing Projects, A Student's Guide. 1st ed., Prentice Hall.
3. Ian, R. (1998). Managing Your Software Project: A Student's Guide. Springer.

Course Name: **Games Development Portfolio**
Course Code: GAT 3203
Year of Study: 3
Semester: 2
Credit Hours: 60
Credit Units: 4

Description: This course gives the overview of software development: Systems; customers, users, and their requirements. It provides general principles of computing: Problem solving, abstraction, division of the system into manageable components, reuse, and simple interfaces. Programming concepts: Control constructs; expressions; use of APIs; simple data including arrays and strings; classes and inheritance. Design concepts: Evaluation of alternative

Course Objectives
The purpose of this course is to:
i. Define personal and group portfolios in gamming
ii. Introduce students to teams' software development
iii. Develop standard documentation of computer programs

Course Learning Outcomes
On completion of this course, the students will be able to:
i. Apply personal and group portfolios in gamming
ii. Manage teams' software development
iii. Understand different standard documentation of computer programs

c. Syllabus

1.	Building a games programming portfolio	6 **hours**
2.	Laws of Physics and game design dynamics	7 **hours**
3.	Flash screens and Flash game development	7 **hours**

4. DirectX and game controllers 7 **hours**
5. Components integration in games development 7 **hours**
6. User interface programming 7 **hours**
7. Documentation of games 7 **hours**
8. Best-practice principles in game development 6 **hours**
9. Managing teams in games development 6 **hours**

Semester **60 hours**

Study Materials

Computers, Laptops, Projector and White boards

Method of Delivery: This Course will be delivered primarily through the lecture method complemented by students' group discussions. In addition, case studies will be used to enhance the students' analytical and communication skills.

Method of Assessment: Assessment will be in terms of tests and practical exercises (30%) and final examination (70%)

Reading List

1. Thielen, D. (2006). No Bugs: Delivering Error Free Code in C++. NY: Prentice Hall
2. Graham, H. (2009). 3D Games Development with Microsoft Silverlight 3. Microsoft Publications

Course Name: **Mobile Game Programming**

Course Code: GAT 3205
Year of Study: 3
Semester: 2
Credit Hours: 60
Credit Units: 4

Description:
Every week, we will cover a specific mobile game programming concept in lecture. For the first couple of weeks, students will spend the lab time working on an individual lab assignment for a simple 2D mobile game, based on the NES classic Duck Hunt The intent is to familiarize students with the initial concepts covered in the first few lectures.

Course Objective
This course provides students with an in depth introduction to technologies and techniques used to create successful mobile games.

The main objectives of this course are:

i. Define method of constructing game project
ii. Develop team game projects
iii. Understanding of Objective-C and Cocos2d
iv. Define mobile usability and design concerns

Course Learning Outcome

On completion of this course unit, the students will be able to:

i. Implement a simple game project construction
ii. Implement two larger game projects in a team environment
iii. Design Objective-C and Cocos2d
iv. Familiarize themselves with mobile usability and design concerns

Concepts **5 hours**

Objective C. Sprites. Mobile input. Mobile game design. Tiled systems. Physics. Artificial Intelligence. Augmented reality games.

Hardware: Programming assignments are for iOS devices (iPad, iPhone, iPod Touch). Students are not required to have their own personal devices, as devices will be available during class as well as on a limited checkout basis from the ITP office.

Course Intro and Objective-C **3 hours**
Course Introduction Advantages Mobile? , Objective-C Cocos2d overview

Cocos2d Basics **3 hours**
Game flow, Scenes, Layers, Nodes, Sprite basics

Mobile Game Input **3 hours**
Basic Touch and Multi-Touch Gestures, Accelerometer, Virtual joypads

Advanced 2D Graphics **3 hours**
Texture Atlases, Animation and Scrolling

Designing for Mobile **3 hours**
Usability, Game case studies, Designing for the impatient gamer

Math and Physics **6 hours**
Quick overview of vector math, Physics principles and Box2d physics system

Artificial Intelligence **4 hours**
AI behaviour, Path finding

Tile maps **4 hours**
Basic tile maps and Isometric tile maps

Advanced Graphical and Audio Effects
Particle systems and Audio effects

Connecting to the World **6 hours**
Multiplayer principles Game Centre and competitors and Push Notifications

Augmented Reality Games **4 hours**
"Social" mobile gaming, ARG case studies and Design principles

3D Introduction **6 hours**
3D math primer, Basics of the 3D world, 3D rendering essentials and Using UDK for 3D development

Advanced 3D on Mobile **6 hours**
Shaders on mobile and advanced 3D effects

Conclusion **4 hours**
Deploying on the App Store and Thin line between success and failure and Future of mobile game

Semester **60 hours**

Study Materials
Computers and Laptops with **Game Maker Studio** for 2D development and **Unity3D** for 3D development installed, Projector and White boards

Method of Delivery: This Course will be delivered primarily through the lecture method complemented by students' group discussions. In addition, case studies will be used to enhance the students' analytical and communication skills.

Method of Assessment: Assessment will be in terms of tests and practical exercises (30%) and annual examination (70%)

Reading List:

1. Learn iPhone and iPad cocos2d Game Development
2. Steffen, I. (2016) Learn Cocos2d 2: Game Development for iOS. ISBN-10: 143024416X.
3. Nathan, B. (2016) Cocos2d for iPhone 1 Game Development Cookbook. ISBN-10: 1849514003.

Course Name: **Digital Motion Graphics, Editing and Compositing**

Course Code: GAT 3206
Year of Study: 3

Semester: 2
Credit Hours: 60
Credit Units: 4

Course Description

This module builds on the foundations of the Level 4 modules, in particular TS4001 and develops knowledge and skills in creating and manipulating motion graphics assets, managing the editing process and compositing multi layered as well as multi nodal visual effects. This includes still images, video, audio, paint, and video based animation and effects.

These skills are further developed to a high level of appreciation, in particular for the flow of work for digital editing and contemporary composting in 2D and 3D spaces. The students will acquire knowledge, develop skills and synthesis media products for self and tutor assessment. Professional level motion graphics, editing and compositing software will be employed. Furthermore studio based green/blue screen filming will be undertaken to create original material for visual effects project work.

Course Objectives

The main objectives of this course are:

i. To gain awareness of digital post production for TV and Film by developing skills in creating and manipulating moving images, within a post-production environment

ii. To gain experience in the techniques of producing a moving image project using professional level software to design and construct a creative moving image sequence incorporating a variety of media for assessment

iii. To provide opportunity to develop professional level skills for combining media elements for compositing

iv. To provide opportunity to develop specific compositing techniques, such as blue screen filming for production of a title sequence for assessment

Course Learning Outcomes

On successful completion of the module, students will be able to:

i. Identify core components of a digital moving image project and software tools

ii. Organise moving image components and apply software tools appropriately to multimedia components

iii. Synthesis a creative self-defined moving image project incorporating a variety of media and design skills, in order to demonstrate good knowledge, skill and design using professional level software.

iv. Demonstrate good knowledge of the work flow for digital editing and compositing

Course Outline

1.	Introduction and review of contemporary digital Motion Graphics software	**4 hours**
2.	Identifying and use key of elements of the interface	**4 hours**
3.	Composition tools for creating mixed media Motion Graphics	**4 hours**
4.	Explore layering techniques using 2D, 2.5D and 3D spaces	**4 hours**
5.	Animating a variety of media and techniques	**4 hours**
6.	Keying, masking and their use within Motion Graphics	**4 hours**
7.	Explore Effects and their applications	**4 hours**
8.	Exporting to various formats and compatibility issues	**4 hours**
9.	Keying e.g. chroma, luma, difference, channels...etc	**4 hours**
10.	Introduction to rotoscoping eg splines, transformations, soft/hard	**4 hours**
11.	Introduction to digital matte painting eg to generate background plate	**4 hours**
12.	Tracking and image stabilisation	**4 hours**
13.	Introduction to combining CGI multipasses appropriately	**4 hours**
14.	Integration with other software applications	**4 hours**
15.	Rendering eg multiple format output	**4 hours**
	Total	**60 hours**

Study Materials
Computers and Laptops with **Game Maker Studio** for 2D development and **Unity3D** for 3D development installed, Projector and White boards

Method of Delivery: This Course will be delivered primarily through the lecture method complemented by students' group discussions. In addition, case studies will be used to enhance the students' analytical and communication skills.

Method of Assessment: Assessment will be in terms of tests and practical exercises (30%) and annual examination (70%)

Reading List

1. Adobe Press Adobe After Effects CSX Classroom in a book (2012)
2. Adobe Premier CSX Classroom in a book, Adobe Press (2012)
3. Ganbar, R, N(2011) Professional Compositing and Visual Effects, Peachpit

Appendix A Programme Budget

Costing

The programme shall be run on cost-recovery basis. The rate shall from time to time be determined by the University Council. Programme enrolment per intake is 40 (forty) students private sponsored respectively. Table 1 shows expect income and expenditure for the programme

Expected Enrolment = 40

Year 1 Semester 1				
Income: 40 x 910,000 = 36,400,000				
S/N	Item	Unit cost	Quantity	Total
1	**Allowance**			
	Teaching allowance for 300 contact hours	32,000	300	9,600,000
	Support staff allowance	5,000	300	1,500,000
2	**Examination**			
	Examination Materials	1,500,000		1,500,000
	Invigilation of six exams including refreshments	9,000	6	54,000
	Marking allowance for 240 scripts per course for 5 courses	1,500	240	360,000
	External Examiners	1,000,000		1,000,000
3	**Machine Equipment Maintenance**			
	Servicing Computers	30,000	120	360,000
	Computers Repair and maintenance	20,000	120	240,000

	Printers and Photocopy Maintenance	50,000	4	200,000
	Antivirus Purchase	50,000	10 Pieces	500,000
4	**Teaching Materials**			
	Whiteboard Markers	10,000	10 Boxes	100,000
	Chocks	5,000	2 boxes	10,000
	Board dusters	5,000	2 Boxes	10,000
	Printing and Photocopying Papers	75,000	2 Cartons	150,000
	Writing Pens	10,000	3 Boxes	30,000
5	**Administrative Cost**			
	Repair of chairs and tables	10,000	45	450,000
	Repair of locks and window fasteners	10,000	15	150,000
	Electrical Maintenances	100,000	Units	100,000
	Generator Fuels	3,500	1000 Liters	3,500,000
	Electricity Bills	600	700 units	420,000
	Water Bills	2,500	200 units	500,000
Total				**20,734,000**
Year 1 Semester 2				
Income: 40 x 910,000 = 36,400,000				
1	**Allowance**			
	Teaching allowance for 300 contact hours	32,000	300	9,600,000
	Support staff allowance	5,000	300	1,500,000
2	**Examination**			
	Examination Materials	1,500,000		1,500,000
	Invigilation of six exams including refreshments	9,000	6	54,000
	Marking allowance for 240 scripts per course for 5 courses	1,500	240	360,000
	External Examiners	1,000,000		1,000,000

3	**Machine Equipment Maintenance**			
	Servicing Computers	30,000	120	360,000
	Computers Repair and maintenance	20,000	120	240,000
	Printers and Photocopy Maintenance	50,000	4	200,000
	Antivirus Purchase	50,000	10 Pieces	500,000
4	**Teaching Materials**			
	Whiteboard Markers	10,000	10 Boxes	100,000
	Chocks	5,000	2 boxes	10,000
	Board dusters	5,000	2 Boxes	10,000
	Printing and Photocopying Papers	75,000	2 Cartons	150,000
	Writing Pens	10,000	3 Boxes	30,000
5	**Administrative Cost**			
	Repair of chairs and tables	10,000	45	450,000
	Repair of locks and window fasteners	10,000	15	150,000
	Electrical Maintenances	100,000	Units	100,000
	Generator Fuels	3,500	1000 Liters	3,500,000
	Electricity Bills	600	700 units	420,000
	Water Bills	2,500	200 units	500,000
Total				**20,734,000**
Recess Semester				
1	Teaching allowance for 135 contact hours	32,000	135	4,320,000
2	Invigilation of two exams including refreshments	9,000	2	18,000
3	Marking allowance for 40 scripts per course for 2 courses	1,500	80	120,000
Total				**4,458,000**
Year 1 Semester 2				

Income: 40 x 910,000 = 36,400,000				
1	**Allowance**			
	Teaching allowance for 300 contact hours	32,000	300	9,600,000
	Support staff allowance	5,000	300	1,500,000
2	**Examination**			
	Examination Materials	1,500,000		1,500,000
	Invigilation of six exams including refreshments	9,000	6	54,000
	Marking allowance for 240 scripts per course for 5 courses	1,500	240	360,000
	External Examiners	1,000,000		1,000,000
3	**Machine Equipment Maintenance**			
	Servicing Computers	30,000	120	360,000
	Computers Repair and maintenance	20,000	120	240,000
	Printers and Photocopy Maintenance	50,000	4	200,000
	Antivirus Purchase	50,000	10 Pieces	500,000
4	**Teaching Materials**			
	Whiteboard Markers	10,000	10 Boxes	100,000
	Chocks	5,000	2 boxes	10,000
	Board dusters	5,000	2 Boxes	10,000
	Printing and Photocopying Papers	75,000	2 Cartons	150,000
	Writing Pens	10,000	3 Boxes	30,000
5	**Administrative Cost**			
	Repair of chairs and tables	10,000	45	450,000
	Repair of locks and window fasteners	10,000	15	150,000
	Electrical Maintenances	100,000	Units	100,000
	Generator Fuels	3,500	1000 Liters	3,500,000
	Electricity Bills	600	700 units	420,000

	Water Bills	2,500	200 units	500,000
Total				**20,734,000**
	Teaching allowance for 300 contact hours	32,000	300	9,600,000
	Support staff allowance	5,000	300	1,500,000
2	**Examination**			
	Examination Materials	1,500,000		1,500,000
Total				**18,625,000**
Year 11 Semester 2				
Income: 40 x 910,000 = 36,400,000				
1	**Allowance**			
	Teaching allowance for 270 contact hours	32,500	270	8,840,000
	Support staff allowance	5,000	300	1,500,000
2	**Examination**			
	Examination Materials	1,500,000		1,500,000
	Invigilation of six exams including refreshments	9,000	6	54,000
	Marking allowance for 240 scripts per course for 5 courses	1,500	240	360,000
	External Examiners	1,000,000		1,000,000
3	**Machine Equipment Maintenance**			
	Servicing Computers	30,000	120	360,000
	Computers Repair and maintenance	20,000	120	240,000
	Printers and Photocopy Maintenance	50,000	4	200,000
	Antivirus Purchase	50,000	10 Pieces	500,000
4	**Teaching Materials**			
	Whiteboard Markers	10,000	10 Boxes	100,000
	Chocks	5,000	2 boxes	10,000
	Board dusters	5,000	2 Boxes	10,000

	Printing and Photocopying Papers	75,000	2 Cartons	150,000
	Writing Pens	10,000	3 Boxes	30,000
5	**Administrative Cost**			
	Repair of chairs and tables	10,000	45	450,000
	Repair of locks and window fasteners	10,000	15	150,000
	Electrical Maintenances	100,000	Units	100,000
	Generator Fuels	3,500	1000 Liters	3,500,000
	Electricity Bills	600	700 units	420,000
	Water Bills	2,500	200 units	500,000
Total				**19,974,000**
Year 111 Semester 1				
Income: 40 x 910,000 = 36,400,000				
1	**Allowance**			
	Teaching allowance for 275 contact hours	32,000	275	8,800,000
	Support staff allowance	5,000	300	1,500,000
2	**Examination**			
	Examination Materials	1,500,000		1,500,000
	Invigilation of six exams including refreshments	9,000	6	54,000
	Marking allowance for 240 scripts per course for 5 courses	1,500	240	360,000
	External Examiners	1,000,000		1,000,000
3	**Machine Equipment Maintenance**			
	Servicing Computers	30,000	120	360,000
	Computers Repair and maintenance	20,000	120	240,000
	Printers and Photocopy Maintenance	50,000	4	200,000
	Antivirus Purchase	50,000	10 Pieces	500,000
4	**Teaching Materials**			

	Whiteboard Markers	10,000	10 Boxes	100,000
	Chocks	5,000	2 boxes	10,000
	Board dusters	5,000	2 Boxes	10,000
	Printing and Photocopying Papers	75,000	2 Cartons	150,000
	Writing Pens	10,000	3 Boxes	30,000
5	**Administrative Cost**			
	Repair of chairs and tables	10,000	45	450,000
	Repair of locks and window fasteners	10,000	15	150,000
	Electrical Maintenances	100,000	Units	100,000
	Generator Fuels	3,500	1000 Liters	3,500,000
	Electricity Bills	600	700 units	420,000
	Water Bills	2,500	200 units	500,000
Total				**19,934,000**
Year 111 Semester 2				
Income: 40 x 910,000 = 36,400,000				
1	**Allowance**			
	Teaching allowance for 275 contact hours	32,000	275	8,800,000
	Teaching allowance for 300 contact hours	32,000	300	9,600,000
	Support staff allowance	5,000	300	1,500,000
2	**Examination**			
	Examination Materials	1,500,000		1,500,000
	Invigilation of six exams including refreshments	9,000	6	54,000
	Marking allowance for 240 scripts per course for 5 courses	1,500	240	360,000
	External Examiners	1,000,000		1,000,000
3	**Machine Equipment Maintenance**			
	Servicing Computers	30,000	120	360,000

	Computers Repair and maintenance	20,000	120	240,000
	Printers and Photocopy Maintenance	50,000	4	200,000
	Antivirus Purchase	50,000	10 Pieces	500,000
4	**Teaching Materials**			
	Whiteboard Markers	10,000	10 Boxes	100,000
	Chocks	5,000	2 boxes	10,000
	Board dusters	5,000	2 Boxes	10,000
	Printing and Photocopying Papers	75,000	2 Cartons	150,000
	Writing Pens	10,000	3 Boxes	30,000
5	**Administrative Cost**			
	Repair of chairs and tables	10,000	45	450,000
	Repair of locks and window fasteners	10,000	15	150,000
	Electrical Maintenances	100,000	Units	100,000
	Generator Fuels	3,500	1000 Liters	3,500,000
	Electricity Bills	600	700 units	420,000
	Water Bills	2,500	200 units	500,000
Total				**19,934,000**

Appendix B Functional Fees

Table 2 shows functional fees payable to the University at the beginning of the 1st Semester of each Academic year.

Table 2: Functional fees payable to University.

Fees	Ugandan Students (UGX)	International Students (USD)	Period
Registration Fee Per	30,000	45	Semester
Late Registration Fee After Two Weeks	20,000	30	Per Semester
Examination Fee	80,000	135	Per Semester

Re-Examination Fee per Course (Retake)	6,000	10	Per Retake
Library User Fee	20,000	30	Per Semester
Capital Development Fee	80,000	45	Once
Technology Fee	50,000	60	Per Year
Internship/Field Attachment Fee	60,000	150	Per Semester
University Identity Card	20,000	15	Per Issue
Guild Fee	30,000	45	Per Semester
UNSA Fee	2,000	5	Per Year
Sports Fee	20,000	30	Per Semester
University Rules Book	5,000	5	Once
Medical Examination Fee	20,000	30	Per Semester
Medical Fee	20,000	15	Per Semester
NCHE	20,000	30	Per Year
Internship fee (Proposed)	120,000	60	Per Year