Short Term Curriculum

Computer System Administrator and Developer

(A Competency Based Modular Curriculum)

Council for Technical Education and Vocational Training
CURRICULUM DEVELOPMENT DIVISION
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Introduction

The competency based and market oriented modular curriculum for "**Computer system Administrator and Developer"**is designed to produce employable workforce equipped with knowledge, skills and attitudes related to the occupation. Once the trainees acquired the competencies they will have ample opportunity for employment through which they will contribute in the national streamline of poverty reduction in the country. The skills and knowledge included in this curriculum improve their knowledge and skills and make them competent **Computer system Administrator and Developer** needed for the occupation.

Aim

The main aim of this program is to produce employable "**Computer system Administrator and Developer"** who could provide different services related to the information technology for public and private sectors in the country and abroad.

Objectives

After completion of this training, the trainees will be able to implement the knowledge and skills related to the:

1. Communication and Employability Skills for IT
2. Computer Systems
3. Information Systems
4. Impact of the use of IT on Business Systems
5. Organizational Systems Security
6. e-Commerce
7. Managing Networks
8. Computer Networks
9. Systems Analysis and Design
10. Event Driven Programming
11. Object Oriented Programming
12. Database Design
13. Client Side Customization of Web Pages
14. Data Analysis and Design
15. Developing Computer Games
16. Human Computer Interaction
17. Web Server Scripting
18. Website Production
19. Digital Graphics
20. Computer Animation
21. Web Animation for Interactive Media
22. Computer Game Design

Course description

This course is designed to help the trainees to provide knowledge and skills on Computer system Administrator and Developer field. This course especially provides skills focusing on the computer system administration and development. Trainees will practice & learn skills using well-equipped computer lab and materials necessary for the program.

Course Structure

Module Number	Module Title	Duration (Hours)		
		Th	Pr	Total
M1	Communication and Employability Skills for IT	18	42	60
M2	Computer Systems	20	40	60
M3	Information Systems	30	30	60
M4	Impact of the use of IT on Business Systems	40	20	60
M5	Organizational Systems Security	30	30	60
M6	e-Commerce	20	40	60
M7	Managing Networks	20	40	60
M8	Computer Networks	20	40	60
M9	Systems Analysis and Design	25	35	60
M10	Event Driven Programming	15	45	60
M11	Object Oriented Programming	20	40	60
M12	Database Design	20	40	60
M13	Client Side Customization of Web Pages	15	45	60
M14	Data Analysis and Design	18	42	60
M15	Developing Computer Games	20	40	60
M16	Human Computer Interaction	30	30	60
M17	Web Server Scripting	20	40	60
M18	Website Production	20	40	60
M19	Digital Graphics	18	42	60
M20	Computer Animation	16	44	60
M21	Web Animation for Interactive Media	15	45	60
M22	Computer Game Design	20	40	60
		470	850	1320

Duration

The total duration of this training program will be of 1320 hours.

Target Group

The target group for this training program will be all interested individuals with educational prerequisite of minimum SLC pass.

Target location

The target location for this training program will be all over Nepal.

Group Size

The group size of this training program will be 24 but need to provide all necessary resources to practice the tasks/competencies as specified in this curriculum.

Medium of Instruction

The medium of instruction for this program will be Nepali or English or both

Pattern of Attendance

Trainee should have 90% attendance during the training period to get the certificate.

Focus of Curriculum

This is a competency-based modular curriculum. This curriculum emphasizes on competency performance. 65% time is allotted for performance and remaining 35% time is for related technical knowledge. So, the main focus will be on performance of the specified competencies in the curriculum.

Entry Criteria

Individuals who meet the following criteria will be allowed to enter this curricular program:

- Minimum of SLC pass or equivalent
- Computer literate
- Should pass entrance examination

Instructional Media and Materials

The following instructional media and materials are suggested for the effective instruction and demonstration.

- ***Printed Media Materials***(Assignment sheets, Case studies, Handouts, Information sheets, Individual training packets, Procedure sheets, Performance Check lists, Textbooks etc.).
- ***Non-projected Media Materials***(Display, Models, Flip chart, Poster, Writing board etc.).
- ***Projected Media Materials***(Opaque projections, Overhead transparencies, Slides etc.).
- ***Audio-Visual Materials***(Audiotapes, Films, Slide-tape programs, Videodiscs, Videotapes etc.).
- ***Computer-Based Instructional Materials***(Computer-based training, Interactive video etc.).

Teaching Learning Methodologies

The methods of teachings for this program will be a combination of several approaches, such as illustrated lecture, group discussion, demonstration, simulation, guided practice, practical experiences, fieldwork and other independent learning.

- Theory: lecture, discussion, assignment, group work.
- Practical: demonstration, observation, guided practice and self-practice.

Students Evaluation Details

- Continuous evaluation of the trainees' performance is to be done by the related instructor/ trainer to ensure the proficiency over each competency under each area of the whole course.
- Related technical knowledge learnt by trainees will be evaluated through written or oral tests as per the nature in the institutional phase of training.
- Trainees must secure minimum marks of 60% in practical and 40% in theoretical evaluations.
- The entrance test will be administered by the concerned training institute.

Trainers' Qualification (Minimum)

- Bachelors or equivalent in related field
- Good communicative and instructional skills
- Experience in related field

Trainer-Trainees Ratio

- In theory classes 1 trainer: 24 trainees
- In practical classes 1trainer: 12 trainees

Suggestions for Instruction

Suggestion for skill training

1. Demonstrate task performance in normal speed.
2. Demonstrate slowly with verbal description of each and every step in the sequence of activity of the task performance using question and answer techniques.
3. Repeat 2 for the clarification on trainees demand if necessary.
4. Perform fast demonstration of the task.

Provide trainees the opportunities to practice the task performance demonstration

1. Provide opportunity to trainees to have guided practice.
2. Create environment for practicing the demonstrated task performance.
3. Guide the trainees in each and every step of task performance.
4. Provide trainees to repeat and re-repeat as per the need to be proficient on the given task performance.
5. Switch to another task demonstration if and only trainees developed proficiency in the task performance.

Other suggestions

1. Apply principles of skill training.
2. Allocate 35% time for theory classes and 65% time for task performance while delivering instructions.
3. Apply principles of learning relevant to the learners' age group.
4. Apply principles of intrinsic motivation.
5. Facilitate maximum trainees' involvement in learning and task performance activities.
6. Instruct the trainees on the basis of their existing level of knowledge, skills and attitude.

Certification

The related training institute will provide the certificate of "**Computer system Administrator and Developer**" to those trainees who successfully complete all 22 modules of this curriculum as prescribed by the curriculum. However for the completion of modular course the training institute will provide the completion certificate as follows;

SN	Module Number	Module Title	Certificate Awarded
1	M1	Communication and Employability Skills for IT	**Certificate of IT Supporter**
2	M2	Computer Systems	
3	M4	Impact of the use of IT on Business Systems	
1	M1	Communication and Employability Skills for IT	**Certificate of Computer Programmer**
2	M2	Computer Systems	
3	M10	Event Driven Programming	
4	M11	Object Oriented Programming	
1	M1	Communication and Employability Skills for IT	**Certificate of Database Designer**
2	M2	Computer Systems	
3	M12	Database Design	
4	M14	Data Analysis and Design	
1	M1	Communication and Employability Skills for IT	**Certificate of Network Administrator**
2	M2	Computer Systems	
3	M7	Managing Networks	
4	M8	Computer Networks	
1	M1	Communication and Employability Skills for IT	**Certificate of e-commerce/Web Programmer**
2	M2	Computer Systems	
3	M6	e-Commerce	
4	M12	Database Design	
5	M13	Client Side Customization of Web Pages	
6	M17	Web Server Scripting	
7	M18	Website Production	
8	M21	Web Animation for Interactive Media	
1	M1	Communication and Employability Skills for IT	**Certificate of System Analyst**
2	M2	Computer Systems	
3	M9	Systems Analysis and Design	
4	M14	Data Analysis and Design	
5	M16	Human Computer Interaction	

SN	Module Number	Module Title	Certificate Awarded
1	M1	Communication and Employability Skills for IT	**Certificate of Computer Game Developer**
2	M2	Computer Systems	
3	M11	Object Oriented Programming	
4	M16	Human Computer Interaction	
5	M19	Digital Graphics	
6	M20	Computer Animation	
7	M22	Computer Game Design	
1	M1	Communication and Employability Skills for IT	**Certificate of Information System Analyst and Designer**
2	M2	Computer Systems	
3	M3	Information Systems	
4	M5	Organizational Systems Security	
5	M9	Systems Analysis and Design	
6	M12	Database Design	
7	M16	Human Computer Interaction	

Physical Facilities

The theory class rooms at least should have area of 10 square feet per trainee and in the workshop it should be at least of 30 square feet per trainees. All the rooms and laboratory should be well illuminated and ventilated.

Module 1: Communication and Employability Skills for IT

Course Information
Module code: M1
Credit value: 10
Learning hours: 60 (18 Theory + 42 Practical)

Aim and purpose
The aim of this module is to ensure that learners understand both the personal attributes valued by employersand the principles of communicating effectively whist developing effective communication skills and addressing their own personal development needs.

Course Description:

Non-technical skills and attitudes, known as soft skills, and the technical skills and knowledge requiredfor specific jobs in IT are key to employability. Soft skills are those skills relating to an individual's ability to communicate and work effectively with others, to use appropriate language, be dependable andconscientious, and to generally behave in an acceptable manner in the workplace. Soft skills complement hard skills, which are the knowledge, understanding and technical skills required to do a job.In this module learners will come to appreciate the soft skills they need to develop to become effectiveemployees. Learners will identify and consider their own soft skills and, through practice, improve these skills.

Communication skills are key to success in any sector but are particularly important in highly technical sectors, such as IT, where the language used can become full of jargon. It is important that learners are able to communicate with non-technical staff and understand when different types and vehicles of communication are appropriate.

IT provides specific software packages and advanced tools that can be used to improve the effectiveness of communications. Through this unit learners will be able to improve their general communication skills and ensure that they understand how to exploit specific application packages and tools.

All individuals, whether learners or employees, must accept the need for continual self-development tomaintain their effectiveness. For this reason, learning outcome 4 involves the use of personal developmentplans which can be used to capture and track training needs, and the accumulation of new skills andknowledge.

Learning outcomes
On completion of this module a learner should:

- Understand the personal attributes valued by employers
- Understand the principles of effective communication
- Be able to use IT to communicate effectively
- Be able to address personal development needs.

Module 1 : Communication and Employability Skills for IT

Time: 60 hrs
Theory: 18 hrs
Practical: 42hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Develop Personal Attributes: • Develop unique skills • Build up positive attitudes	**<u>Perfect Employee</u>** • Attributes o Job related (Technical Knowledge) o Knowledge of good working procedures • Skills o Planning o Organizational o Time management o Team working o Verbal o Written o Numeracy o Creativity • Work Ethic • Goal • Strategy • Objectives • Fundamentals • Attitude o Determination o Independent o Integrity o Tolerance o Problem solving o Leadership o Confidence o Self-motivation	**5**	**15**	**20**

2. Apply Principles of Effective Communication • Participate in group discussions • Identify communication barriers • Write reports to reduce barriers • Apply interpersonal skills	**<u>Principles of Effective Communication</u>** • General o Cultural differences o Terminology o Text format o Accuracy o Engaging audience • Barriers o Background noise o Distraction o Lack of concentration • Interpersonal o Methods o Signing o Lip reading o Techniques o Body language o Positive language • Writing o Guidelines o Smileys o Emoticons o Key message o Spelling o Grammar o Proof reading o Note taking	**5**	**15**	**20**
3. Communicate Effectively by Using IT • Apply different communication channel • Use software for effective communication • Review information	• **<u>Channel</u>** o Word processed o Presentation o Email o Web pages o Blogs o Vlogs o Podcasts o Video conferencing • **<u>Software</u>** o Word processing o Presentation package o Email software • **<u>Review</u>** o Proofing o Thesaurus o Spell checkers	**4**	**6**	**10**

4. Assess Personal Development Needs • Identify needs • Address needs • Apply learning styles	• **<u>Needs</u>** o Formal reports o Appraisal o Customer feedback o Performance data o Self-assessment • **<u>Records</u>** o Target setting o Appraisal records • **<u>Addressing</u>** o Job shadowing o Team meetings o Attending events o Training (Internal/External) • **<u>Learning Styles</u>** o System (Active/reflective) o Sensing/Intuitive o Visual/Verbal o Sequential/Global	4	6	10
Total Duration (Hours)		18	42	60

Required tools and equipment: Well-equipped computer lab, multimedia projector

<u>Learning Resources:</u>

Bolton R – *People Skills* (Simon & Schuster, 1986) ISBN-10 067162248X, ISBN-13 978-0671622480

Barker A – *Improve Your Communication Skills, 2nd Edition* (Kogan Page, 2006) ISBN-10 0749448229,ISBN-13 978-0749448226

<u>Website</u>

www.mindtools.com/page8.html

Module 2: Computer Systems

Course Information
Module code: M2
Credit value: 10
Learning hours: 60 (20 Theory + 40 Practical)

Aim and purpose
The aim of this module is to enable learners to understand the components of computer systems and develop the skills needed to recommend appropriate systems for business purposes and set up and maintain computer systems

Course Description:

At some stage most IT professionals will have to set up and customize a computer system or systems. To do so effectively they will need to understand the components that make up computer systems. The operating system interacts with the hardware and software components in order to make a functioning machine.

In this module learners will consider a range of hardware and come to understand the technical specifications of components. There are a number of different operating systems, despite the dominance of the Microsoft operating system, and learners will explore at least one other. In terms of software, the operating system itself often provides utility programs that assist the user in managing the machine. Other third party software utility programs such as virus checkers are also used extensively. This module considers both types of utility software.

IT professionals will often be asked to recommend systems for varied user needs. There are many different manufacturers of computer systems and each manufacturer produces a wide range of models with different specifications. Deciding which particular model is appropriate for a given situation depends on a variety of factors. These factors are explored in this unit so that learners can make informed choices when recommending computer systems.

IT professionals also need to develop the skills required to install and configure computer systems. A large part of this unit will involve practical work in installing hardware components and software, configuring systems to meet specific requirements and testing to ensure a fully functioning system is produced.

Learning outcomes
On completion of this module a learner should:

- Understand the components of computer systems
- Be able to recommend computer systems for a business purpose
- Be able to set up and maintain computer systems

Module 2: Computer Systems

Time: 60 hrs
Theory: 20 hrs
Practical: 40 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Familiarize with Computer Systems	**<u>Introduction to Computer System</u>** • Introduction • History • Types • Applications • Capabilities and Limitations	**2**	**0**	**2**
2. Familiarize with Components of Computer System **2.1 Familiarize with Internal System Components** • Demonstrate physical hardware components	**<u>Components of Computer System</u>** • Processors • Motherboard • BIOS • Power Supply • Fan and Heat sink or • Cooling • Hard drive configuration and controllers e.g. SATA, IDE, EIDE, master, slave • Ports e.g. USB, parallel, serial • Internal memory e.g. RAM, ROM, cache • Specialized cards e.g. network, graphic cards	**4**	**2**	**6**
2.2 Familiarize the Backing Storage • Demonstrate different storages devices. • Use different storages devices	**<u>Backing Storage</u>** • Disks • Pen drives • Optical media • Flash memory cards • Portable and fixed drives • Performance factors o Data transfer rate o Capacity	**4**	**2**	**6**

2.3 Familiarize with Operating System Software • OperateLINUX • Operate windows • Operate DOS • Operate MAC OS • Operate command line and GUI	**<u>Operating System Software</u>** • Types **<u>Operating System Functions and Services</u>** • Machine and peripheral management • Security • File management • Device drivers **<u>Features</u>** • Ability to customize • Support forconnectivity of portable media • Security • Stability and reliability • Ease of management • Associated utilities • Cost and support for the user	**3**	**8**	**11**
2.4 Familiarize with Software Utilities • Enable Firewall and Virus protection • Format Drives	**<u>Software Utilities</u>** • Security o Virus protection o Firewalls • Clean up tools for o Cookies o Internethistory o Defragmentation • Drive formatting	**2**	**2**	**4**
3. Familiarize with Business perspective of Computer System • Conduct case study of computerized business organization.	**Considerations for Selection** • Cost • User requirements o Software to be used o Network Sharing o Need formaintenance contract o Outputs required o Need for integration with other systems e.g. home entertainment • Processing power • Storage capacity • Accessibility for disabled users • The ICT competence of the intended user • Training requirements	**3**	**5**	**8**

4. Maintain Computer System **4.1 Set up Computer System** • Assemble a computer system	**<u>Connection and Set up</u>** • Monitor • Printer • Modem/router • Keyboard • Mouse • Speakers • Microphone	**1**	**2**	**3**
4.2 Install hardware components	**<u>Hardware Installation</u>** • Graphics Card • Sound Card • CD/DVD drive • RAM • Hard drive	**0**	**3**	**3**
4.3 Install Software • Install operating system software • Install application software • Install security software • Install device drivers • Create appropriate directory/folder structures	**<u>Software Installation</u>** • Operating system software e.g.windows • Applications software e.g. Microsoft Office • Security software e.g. virus checkers, firewalls • Device drivers • Create appropriate directory/folder structures	**1**	**4**	**5**
4.4 Configure assembled computer • Configure BIOS • Configure Anti-virus • Configure desktop	**<u>Configuration</u>** • BIOS Configuration • BIOS password • Editing power management options **<u>Anti-virus Configurations</u>** **<u>Desktop Configuration</u>** • Icon size • Font size • Color • Background • Icon Choice • Start-up options • File sharing/permissions	**0**	**4**	**4**

4.5 Test installed software • Test software applications • Test default folder setting • Test desktop shortcuts • Test device drivers • Test paper sizes printing • Test menu options • Test date and time	**Testing** • Type • Procedure	**0**	**3**	**3**
4.6 Perform routine maintenance • Organize files and folders • Back-up files and folders • Schedule and delete of unwanted data automatically • Archive files and folders • Perform defragmentation • Replace consumables items • Replace damage components	**Routine maintenance** • Importance • Schedules • Procedures	**0**	**5**	**5**
Total Duration (hours)		**20**	**40**	**60**

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

- Anderson H and Yull S - BTEC Nationals IT Practitioners: Core Units for Computing and IT (Newnes, 2002) ISBN-10 0750656840, ISBN-13 978-0750656849
- Fulton J - Complete Idiot's Guide to Upgrading and Repairing PCs, 4th Edition (Alpha, 1999) ISBN-10 0789722062, ISBN-13 978-0789722065
- Knott G and Waites N - BTEC Nationals for IT Practitioners (Brancepeth Computer Publications, 2002) ISBN-10 0953884821, ISBN-13 978-0953884827
- White R and Downs T - How Computers Work, 9th Edition (Que, 2007) ISBN-10 0789736136, ISBN-13 978-0789736130

Websites:

- www.computerweekly.com
- www.bized.co.uk

Module 3: Information Systems

Course Information
Module code: M3
Credit value: 10
Learning hours: 60 (30 Theory + 30 Practical)

Aim and purpose
The aim of this module is to ensure learners understand how organizations use information and the surrounding use of information, know about information systems and develop the skills necessary to produce management information.

Course Description:
Information systems are combinations of software, hardware and communication networks, used to collect, organize and distribute useful information within organizations. The availability of reliable information, presented in an appropriate format is the basis for good decision making. It can be used by organizations for obtaining a competitive advantage and promote efficiency. People need to become skilled manipulators and users of information to ensure that organizations become more efficient and succeed in achieving their aims and objectives.

In this module, learners will manipulate data to generate meaningful information. Learners will use an IT tool, such as a spreadsheet or a database, to process data and therefore this module would fit well with any of the modules introducing appropriate software packages. As IT users, we need to make judgments about sources and accuracy of information and be able to select and manipulate information to support sound decision making. Not all information is current or accurate. In this module learners will find out how to select their sources and decide on how much credence can be placed in them.

To understand and appreciate how organizations use information, it is necessary to appreciate how businesses operate and the functional areas into which they are divided. This module looks at these areas, as well as exploring the formal ways that internal and external information flows can be represented. There is scope for this to be contextualized through the setting up of mini-enterprises.

In any organization it is important that employees know the constraints that impact on the use of information and learners will consider issues such as data protection and other legislation.

Learning outcomes
On completion of this module a learner should:

- Understand how organizations use business information
- Understand the issues related to the use of information
- Know the features and functions of information systems
- Be able to use IT tools to produce management information

Module 3: Information Systems

Time: 60hrs
Theory: 30 hrs
Practical: 30 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Familiarize with Business Information	**<u>Business Information</u>** • **Types of information** o Qualitative/Quantitative o Primary/Secondary • **Purposes of information** o Operational support e.g. monitoring and controlling activity o Analysis e.g. to identify patterns or trends o Decision making (operational, tactical, strategic) o commercial advantage • **Sources of information** • Internal o Financial o Personnel o Marketing o Purchasing o Sales o Manufacturing • Administrative • External o Government o Trade groupings o Commercially provided o Databases o Research • Reliability of data sources • **Good information** o Characteristics • **Business functional areas** • **Information flows** o Internal information flows o Information flows to external bodies o Information flow diagrams	**8**	**0**	**8**

2. Understand the Issues Related to Use of Information	**<u>Information Usages</u>**
	
	Legal issues
	• Relevant data protection legislation
	  o Data Protection Act
	  o Freedom of Information Act
	• Other relevant legislation
	  o Computer Misuse Act
	
	Ethical issues
	• Codes of practice
	• Whistleblowing
	• Organizational policies
	• Information ownership
	
	Operational issues
	• Security of information
	• Backups
	• Health and safety
	• Organizational policies
	• Business continuance plans
	• Costs
	  o Additional resources required
	  o Cost of development
	  o Impact of increasing sophistication of systems
		8	**0**	**8**

3. Familiarize with the Features and Functions of Information System
 	
• Conduct a case study of an organization to identify role of MIS
	<u>Features and Functions of Information System</u>
	• Features
	  o Data
	  o People
	  o Hardware
	  o Software
	  o Telecommunications
	• Functions
	  o Input
	  o Storage
	  o Processing
	  o Output
	  o Control and feedback loops
	  o Closed and open systems
	• Transformation of data into information:
	  o Distinction between data and information
	  o Collection, storage, processing, manipulation, retrieval, presentation
	
	Types of information system
	• Management information systems
	  o Features
	  o Benefits
	  o Effectiveness criteria
	  ▪ Accuracy
	  ▪ Sustainability
	  ▪ Response times
	  o Confidence
	• Others
	  o Marketing (sales performance, competitors etc)
	  o Financial (financial costs, investment returns etc)
	  o Human resources (HR) (staffing, professional development etc)
		10	**10**	**20**

4. Use IT Tools • Gather information • Analyze information • Manage information • Produce report	**<u>IT Tools to produce Management Information</u>** **Tools** • Software o Databases o Artificial intelligence and expert systems o Predictive modeling o Internet o Others ▪ Data mining systems • Informationgathering o Requirement o Sources of information o Other factors to be considered ▪ Constraints o Select information • Informationanalysis • Quality o Validity o Accuracy o Currency o Relevance o Identify alternatives • Information management • Reports o Sales report o Collegeenrolment statistics o Marketing analysis	**4**	**20**	**24**
Total Duration (hours)		**30**	**30**	**60**

Required tools and equipment: Well-equipped computer lab, multimedia projector

<u>Learning Resources:</u>

- Anderson H and Yull S - BTEC Nationals IT Practitioners: Core Units for Computing and IT (Newnes, 2002) ISBN-10 0750656840, ISBN-13 978-0750656849
- Bocij P, Greasley A and Hickie S - Business Information Systems: Technology Development and Management for the e-business, Edition 4 (FT Prentice Hall, 2008) ISBN-10 027371662X, ISBN-13 978-0273716624
- Knott G and Waites N - BTEC Nationals for IT Practitioners (Brancepeth Computer Publications, 2002) ISBN-10 0953884821, ISBN-13 978-0953884827

<u>Websites:</u>

- www.comp.glam.ac.uk/pages/staff/tdhutchings/chapter1.html

Module 4: Impact of the use of IT on Business Systems

Course Information
Module code: M4
Credit value: 10
Learning hours: 60 (40 Theory + 20 Practical)

Aim and purpose
The aim of this module is to ensure learners understand the effects developments in IT have on organizations and how organizations respond to these developments, and enable learners to propose IT-enabled improvements to business systems.

Course Description:
Developments in IT have had a major impact on the way organizations operate. Few organizations in the developed world would be able to survive in a competitive market without utilizing IT in some way. New technologies are being developed all the time and organizations often need to upgrade their computer systems if only to keep up with the competition.

This unit starts by exploring the range of new technologies that have had an impact on business and then considers why organizations need to respond, how they will benefit and what the implications of change may be. Some established businesses have failed because they have not been nimble enough in adapting to the new information technologies. The business environment has changed as a result of technology. The borders between local, national and global markets have disappeared.

The impact of changing technology on both employers and employees is considered. Employment patterns and the expertise required of staff are changing. Flexibility in the face of new information technologies will be essential if organizations and individuals are to survive and flourish in the business world.

Learning outcomes
On completion of this unit a learner should:
1 Understand the effect of developments in information technology on organizations
2 Understand how organizations respond to information technology developments
3 Be able to propose improvements to business systems using IT

Module 4: Impact of the use of IT on Business Systems

Time: 60 hrs
Theory: 40 hrs
Practical: 20 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Understand the Impact of IT on Organizations	**<u>Impact of Information Technology</u>** • Development of hardware: o Power o Capacity and sophistication of computer platforms o Sophistication of communication technologies • Development of software: o Sophistication and integration of application software o Specialized support software o Security software o e-commerce • Reasons for upgrading systems: o External pressures o Enhance business opportunities o Improve customer service • Benefits: o Productivity gains o Cost reductions o Increase profitability o Efficiency o Improve management information o Improve customer service o Synergy and integration of systems • Impact: o Cost o Procedures o Dealing with redundancies o Core and outsourced staff o Home and remote working o Integration of legacy systems o Security	**12**	**0**	**12**

2. Understand the Response of Organization on IT Developments	**<u>Response of Organizationson IT Developments</u>**
	Responses:
	• Adapting business processes
	  o Sales and marketing strategies for global opportunities
	  o Purchasing strategies for automated ordering
	  o Customer support processes for online systems
	  o Financial systems for secure funds transfer
	  o Automating manufacturing processes
	• No response
	• Staff training
	• Redundancies
	Managing risk:
	• Cyber crime
	  o Diverting financial assets
	  o Communications sabotage
	  o Intellectual property theft
	  o Denial of service attacks
	• Preventive technologies
	  o Firewalls
	  o Access control methods
	  o Secure payment systems
	• Disaster recovery
		14	**0**	**14**

3. Improve business system using IT • Perform comparative study of an IT enabled business organization and legacy company and prepare a report	**Improvement of Business System** • **IT developments:** o New applications o Wireless technologies o Operating systems o Innovative software platforms o Changing market leaders o Future developments • **IT improvements:** o Integrated systems o Databases o Networks o Communication technologies o Web presence o Management reports • **Business systems:** o Customer relationship management o Supplier management o Product development o Service delivery o People management o Stock control o Finance	**14**	**20**	**34**
Total Duration (hours)		40	20	60

Required tools and equipment: Well equipped computer lab, multimedia projector

Learning Resources:

Bocij P, Greasley A and Hickie S – *Business Information Systems: Technology Development and Management for the e-business, Edition 4* (FT Prentice Hall, 2008) ISBN-10 027371662X, ISBN-13 978-0273716624

Reynolds J – *E-Business: A Management Perspective* (OUP Oxford, 2009) ISBN-10 0199216487, ISBN-13 978-0199216482

Module 5: Organizational Systems Security

Course Information

Module code: M5

Credit value: 10

Learning hours: 60 (30 Theory + 30 Practical)

Aim and purpose

Theaimofthis module istoenablelearnerstounderstandpotentialthreatstoITsystemsandthe organizational issuesrelated toITsecurityandknowhowtokeepsystemsanddatasecurefromthesethreats.

Course Description:

Ensuring the security of computer systems and, crucially, the information they need is vital. Organizations and customers require confidence in these matters and security is critical to the successful deployment and use of IT. In this unit learners will consider physical security of computer systems from simple locks to complex biometric checks, as well as software-based security using, for example, passwords, access rights and encryption.

Potential threats to security arise in different ways. For example security problems are sometimes related directly to malicious intent from internal or external sources, but in other circumstances, such as software piracy, problems can occur by accident or unknowingly. The advent of e-commerce brought with it a whole new set of potential threats and issues for organizations to deal with.

Learning outcomes

On completion of this module a learner should:

1 Understand the impact of potential threats to IT systems

2 Know how organizations can keep systems and data secure

3 Understand the organizational issues affecting the security of IT systems

Module 5: Organizational Systems Security

Time: 60 hrs
Theory: 30 hrs
Practical: 30 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Understand the Impact of Potential Threats to IT Systems • Prepare a short guide to IT security threats and their impact on organizations	**<u>Potential Threats:</u>** • Malicious damage: ▪ Internal ▪ External ▪ Access causing damage ▪ Access without damage ▪ Specific examples o Phishing o Identity theft o Piggybacking o Hacking • Threats related to e-commerce: ▪ Website defacement ▪ Control of access to data via third party suppliers ▪ Denial of service attacks • Counterfeit goods: ▪ Products at risk ▪ Distribution mechanisms • Organizational impact: ▪ Loss of service ▪ Loss of business or income ▪ Increased costs ▪ Poor image • Information security: ▪ Confidentiality ▪ Data integrity ▪ Data completeness ▪ Access to data	**8**	**5**	**13**

2. KeepSystems and Data Secure ● Perform Physical Security Audit of Organization ● Perform Software Security Audit of Organization ● Perform Network Security Audit of Organization	**<u>Systems and Data Security</u>** • Physical security: ▪ Locks ▪ Visitors passes ▪ Sign in/out systems ▪ Biometrics e.g. retinal scans, fingerprint, voice ▪ Recognition ▪ Guards ▪ Cable shielding • Software and network security: ▪ Encryption techniques o public and private key ▪ Call back ▪ Handshaking ▪ Diskless networks ▪ Use of backups ▪ Audit logs ▪ Firewall configuration ▪ Virus checking software ▪ Use of virtual private networks (VPN) ▪ Intruder detection systems ▪ Passwords ▪ Levels of access to data ▪ Software updating ▪ Disaster recovery o Backup systems o Whole system replacement o Tiers of recovery	**12**	**15**	**27**

3. Understand IT System Security • Prepare a report on organizational security issues.	**Issues Affecting the Security of IT Systems** • Security policies and guidelines: o Disaster recovery policies o Updating of security procedures o Scheduling of security audits o Codes of conduct o Surveillance policies o Risk management o Budget setting • Employment contracts and security: o Hiring policies o Separation of duties o Ensuring compliance o Disciplinary procedures o Training and communicating f • Laws &Legislation • Copyrights: o Open source o Freeware o Shareware o Commercial software • Ethical decision making: o Freedom of information versus personal privacy o Permission to use photographs or videos, CCTV footage • Professional bodies: o Business Software Alliance (BSA) o Federation Against Software Theft (FAST) o British Computing Society (BCS) o Association of Computing Machinery (ACM) o Computer Association of Nepal (CAN)	**10**	**10**	**20**
Total Duration (hours)		30	30	60

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

Beekman G and Quinn M J – *Computer Confluence Complete: and Student CD – 1st international edition* (Pearson Education, 2005) ISBN-10 1405835796, ISBN-13 978-1405835794
Heathcote P – *A Level ICT – revised edition* (Payne Gallway, 2004) ISBN-10 0953249085, ISBN-13 978-0953249084

Module 6: e-Commerce

Course Information
Module code: M6
Credit value: 10
Learning hours: 60 (20 Theory + 40 Practical)

Aim and purpose

The aim of this module is to ensure that learners know the technologies involved in e-commerce, understand the impact of e-commerce on organizations and on society, and that they are able to plan e-commerce strategies.

Course Description:

One of the most important developments in business in recent times has been the increasing use of e-commerce. It has revolutionized many marketplaces and opened up opportunities never before imagined.

Businesses that are not exploring the use of e-commerce are in danger of finding themselves being overtaken by those who are utilizing this technology. E-commerce uses the internet to build and enhance relationships with customers, partners and other businesses. This can involve processing orders electronically, handling customer service and cooperating with business partners.

E-commerce can be conducted using the internet, intranets, extranets, or a combination of these. The unit starts by looking at the technologies needed to operate e-commerce, i.e. the hardware, software and networking required for an e-commerce system to be implemented. Different categories of e-commerce such as e-tailers (those operating only online) and financial services, and the benefits and drawbacks for organizations of using e-commerce are considered. Attention is given to issues such as legislation and promotion

Finally, after assessing commercial sites, learners will bring all their learning together to develop an e-commerce strategy for a new business.

Learning outcomes
On completion of this module a learner should:

- Know the technologies required for an e-commerce system
- Understand the impact of e-commerce on organizations
- Understand the effects of e-commerce on society
- Be able to plan e-commerce strategies.

Module6 : e-Commerce

Time: 60hrs
Theory: 20 hrs
Practical: 40 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Know the Technologies Required for e-business and e-commerce • Conduct feasibility study	**<u>e-business and e-commerce</u>** • Introduction • Fundamentals • Technology • E-business infrastructure • E-environment • Impact of e-commerce on organizations • Effect of e-commerce on society • Impact of e-communications • E-business opportunities	**4**	**16**	**20**

2. <u>Plan e-commerce and e-business strategy</u> • Plan e-Commerce strategies • Plan e-business strategies • Review regulation • Examine the social implications • Apply e-business strategy • Apply e-commerce strategy • Analyze Competitive environment and threats	**<u>e-commerce and e-business strategy</u>** • E-business strategy • E-commerce strategy • Competitive environment analysis and threats • Internet revenue • Risk and barriers • Regulations governing e-commerce • Supply chain management o Problems o Logistics o Push and Pull Supply o Value Chain Analysis o Value Networks • E-procurement o Understanding the process o Types o Participant in online procurement o Drivers of e-procurement o Risk and impact o B2B marketplace o Future • E-marketing o E-marketing, e-business and e-commerce o Market and product positioning o Target market strategy • Customer relationship management o Benefits of CRM o Customer profiling	**8**	**16**	**24**

3. Design and Develop e-commerce and e-business • Design and develop webpage • Maintain webpage • Analyze workflow management • Analyze process modeling and mapping	**Design and Develop e-commerce and e-business** • Change management o Challenges of e-business transformations o Different types o Staff retention o Outsourcing • Analysis and design o Workflow management o Process modeling and mapping o Design for e-business o Customer orientation • Implementation and maintenance o Creating static web content o Testing o Changeover o Content management and maintenance	**8**	**8**	**16**
Total Duration (hours)		20	40	60

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

- Chaffey D - E-business and E-Commerce Management, Second Edition (FT Prentice Hall, 2003) ISBN-10 0273683780, ISBN-13 978-0273683780
- Malmsten E, Leander K, Portanger E and Drazin C - Boo Hoo: A Dot.com Story (Random House Business Books, 2002) ISBN-10 0099418371, ISBN-13 978-0099418375
  Vise D - The Google Story (Pan, 2008) ISBN-10 0330508121, ISBN-13 978-0330508124

Websites

- www.ico.gov.ukInternational Commissioner's Office
- www.w3.orgWorld Wide Web Consortium

Module 7: Managing Networks

Course Information
Module code: M7
Credit value: 10
Learning hours: 60 (20 Theory + 40 Practical)

Aim and purpose
The aim of this module is to enable learners to understand network management functions and develop the knowledge and skills needed to use the tools and technologies available to the network manager.

Course Description:
In the business world the use of networked computer systems is commonplace and often essential. Therefore, it is important that business network systems run as effectively and efficiently as possible with minimum down-time and flexibility to change as requirements change.

This moduleexamines the principles of network management, allowing learners to understand the different functions and types of activity that network managers need to understand.

Network managers have a variety of tools to assist them in monitoring and maintaining networks. Specialist software tools are used to assist network managers and learning outcome 1 deals with these tools and techniques, although learners will need to become familiar only with a limited number of products. The pace of change in networking technologies and the technologies that support network managers is rapid.

Learning outcomes
On completion of this module a learner should:
1 Know about networking management tools and technologies
2 Understand network management functions
3 Be able to carry out network management activities.

Module 7: Managing Networks

Time: 60 hrs
Theory: 20 hrs
Practical: 40hrs

Task/contents	Related Technical Knowledge	Time		
		Th	Pr	Total
1. Familiarize with Networking Management Tools and Technologies	**Networking Management Tools and Technologies** • Network technologies: ▪ Operating systems ▪ Protocols ▪ Layout ▪ Devices • Networking operating systems: ▪ Windows, Linux • Networking protocols: ▪ SNMPv3 ▪ ICMP • Layout: ▪ Cabling ▪ Topologies ▪ Wireless • Network devices: ▪ Servers ▪ Workstations ▪ Interconnection devices ▪ Network cards ▪ Vendor specific hardware • Networking tools: ▪ Purpose o Fault management o Performance management ▪ Specific tools: HP Openview, Cisco Works, Wireshark ▪ Using system software • Emerging technologies: ▪ Server virtualization ▪ Video on demand • Impact of emerging technologies ▪ Enhanced capabilities o Faster o Greater storage capacity o Improved control ▪ New work methods o Mobile working o Home working o Web centric applications ▪ Ease of use	**6**	**0**	**6**

2. Manage Network • Prepare a Network layout for an organization with more than 25 computers.	**<u>Network Management Functions</u>** • Configuration • Fault management • Account management • Performance variables o Network throughput o User response times o Line utilization • Other activities o Planning o Designing o Installing • Network operations o Security o Data logging o Checking performance and traffic • Reporting	**3**	**6**	**9**
3. Configure Host • Define configuration and personalization strategy • Setup server on Linux OS • Setup server on WINDOWS OS	**<u>Host Configuration</u>** • Physical Consideration of Server Room • Server startup and shutdown management • Configuring workstations • Personalizing workstations • Operating system selection and installation • Software selection and installation	**2**	**8**	**10**
4. Manage Users • Prepare Policy that includes: o User registration o User access control o User resource control • Prepare computer usage policy	**<u>User Management</u>** • User registration • Account Policy • Login environment • User support services • Controlling user resources • Controlling user access • Online user services • Ethical conducts • Computer usage policy	**3**	**6**	**9**
5. ConfigureNetwork and System • Setup directory services • Write server script for controlling user access and configuration	**<u>Network and System Administration</u>** • Information model and directory services • System infrastructure • Network administration models • Network management technologies • System maintenance models • Policy and configuration automation • Integrating multiple OSs	**2**	**4**	**6**

6. Maintain System • Write server script for job scheduling	**System Maintenance** • Change management • Clock synchronization • Job scheduling • Preventative host maintenance • SNMP tools • Database configuration management	**2**	**8**	**10**
7. Implement Security • Prepare system recovery policy • Implement data backup plan • Select and install firewall • Analyze network security	**Security Implementation** • System design and normalization • Recovery Plan • Data integrity and protection • Authentication methods • Virtual Private Networks (VPNs): secure shell and Frees/WAN • WWW security • Ordered Access control policy • IP filtering • Firewalls • Intrusion detection and prevention	**2**	**8**	**10**
Total Duration (hours)		20	40	60

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

Burgess M – *Principles of Network and System Administration, 2nd Edition* (John Wiley and Sons Ltd, 2003) ISBN 0470868074

Limoncelli T and Hogan C – *The Practice of System and Network Administration* (Addison Wesley, 2001) ISBN 0201702711

Olifer N and Olifer V – *Computer Networks*: *Principles, Technologies and Protocols for Network Design* (John Wiley and Sons Ltd, 2005) ISBN 0470869828

Subramanian M – *Network Management*: *An Introduction to Principles and Practice* (Addison Wesley, 2000) ISBN 0201357429

Module 8: Computer Networks

Course Information
Module code: M8
Credit value: 10
Learning hours: 60 (20 Theory + 40 Practical)

Aim and purpose
The aim of this module is to ensure learners understand the key components of networked systems, know about network protocols and the services provided by network systems and develop the skills required to ensure network security.

Course Description:
Networks are used in one way or another by virtually every organization, from simple use of internet services through internal file sharing to wide area networks exchanging data across continents. Therefore, it is essential that learners thinking of careers within the IT industry have a good understanding of the underlying principles of networking and how data travels around networks.

This module starts by exploring the different types of networks and the standards relating to network systems, including local and wide area networks. Networks can be either wired or wireless systems and, although much of the underpinning content is similar, this unit does make reference to both.The hardware and software components used in networks and their operation are explored and learners will develop an understanding of their functions and how they relate to each other, particularly how connections are made and the purpose of these connection devices.

Learning outcomes
On completion of this module a learner should:
1 Know types of network systems and protocols
2 Understand the key components used in networking
3 Know the services provided by network systems
4 Be able to make networked systems secure.

Module 8: Computer Networks

Time: 60 hrs
Theory: 20 hrs
Practical: 40 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	Pr	Total

1. Familiarize with Computer Networks	**<u>Computer Networks</u>**
	• Networking
	  o Introduction
	  o Need
	  o Business benefits
	• Networking jobs
	  o Administrator
	  o Engineer
	  o Designer/architect
	• Basic terminologies
	  o LAN, WAN, MAN
	  o Speed
	  o Traffic
	  o Administration
	Relationship Types
	• Peer-to-Peer Networks
	• Client/Server Network
	• Peer-to-Peer vs. Client server networks
	Features
	• File sharing
	• Printer Sharing
	• Application Services
	• E-mail
	• Wide area networks
	• Internet and Intranet
	• Security
	OSI Model
	• OSI Layers
	  o Physical Layer
	  o Data-Link layer
	  o Network Layer
	  o Transport Layer
	  o Session Layer
	  o Application Layer
	• Data Communication through OSI layers
	Hardware Components
	• Servers
	• Hubs, Routers and Switches
	• Cabling and Cable Plants
	• Workstation Hardware
		6	**0**	**6**

2. Network Cabling • Design layout • Prepare cables • Lay cables • Connect devices	**<u>Network Cabling</u>** • **Topologies** o Bus o Star o Ring o Comparing Bus, Star and Ring • **Media** o Wired o Wireless • **Installing and Maintaining** o Cabling Plan o Cable selection o Issues in efficient cabling	**2**	**4**	**6**
3. Configure Network • Configure hardware • Set up firewall • Connect RS-232 devices	**<u>Network Hardware</u>** • **Configuration** o Repeaters o Hubs and concentrators o Switches o Bridges o Routers o Gateway o Access point • Firewall • RS-232	**2**	**10**	**12**
4. Set up WAN Connections	**<u>WAN Connections</u>** • WAN needs o Analyzing requirements o Shared vs. dedicated o Private vs. public • WAN connection types o Plain old telephone service (POTS) o Integrated Service Digital Network (ISDN) o Digital Subscriber Line (DSL) o T-2/T-3 (DS1/DS3) Connections o X.25	**2**	**10**	**12**

5. Set up Servers • DNS • Mail • File • Web	**Networking Protocols** • **TCP/IP and UDP** • **Domain Name System (DNS)** • **Dynamic Host Configuration Protocol (DHCP)** • **Hypertext Transfer Protocol (HTTP)** • **File Transfer Protocol (FTP)** • **Network News Transfer Protocol (NNTP)** • **Telnet** • **Simple Mail Transfer Protocol (SMTP)** • **Post office Protocol (POP)** • **Voice Over** IP (VOIP)	**4**	**8**	**12**
6. Secure the Network • Create user account • Configure permission • Set up security layer	**Network Security** • Internal Security o Account security o Password security o File and directory permission o Practices and user education • External Threat o Front-door threats o Back-door threats o DoS Threats	**2**	**4**	**6**
7. Recover Network Disaster • Create backup • Restore backup • Apply mirroring techniques	**Network Disaster Recovery** • Disaster recovery plan o Disaster recovery needs o Disaster scenarios o Handling communications o Critical components • Backup and restore procedures o backup needs o backup media and technologies o backup and recovery strategies	**2**	**4**	**6**
Total Duration (hours)		20	40	60

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

Dodd A Z – *The Essential Guide to Telecommunications, 4th Edition* (Prentice Hall, 2005) ISBN-10 0131487256, ISBN-13 978-0131487253
Hallberg B – *Networking: A Beginner's Guide, 5th Edition* (Osborne/McGraw-Hill US, 2009) ISBN-10 0071633553, ISBN-13 978-0071633550
Lowe D – *Networking All-in-One Desk Reference for Dummies, 3rd Edition* (John Wiley & Sons, 2008) ISBN-10 0470179155, ISBN-13 978-0470179154
Schiller J – *Mobile Communications, 2nd Edition* (Addison Wesley, 2003) ISBN-10 0321123816, ISBN-13 978-0321123817

Module 9: Systems Analysis and Design

Course Information
Module code: M9
Credit value: 10
Learning hours: 60 (25 Theory + 35 Practical)

Aim and purpose
The aim of this module is to enable learners to gain an understanding of the principles of systems analysis and equip them with the skills to analyze business requirements and design solutions to meet business needs.

Course Description:
Systems analysis informs the development of large or small, but often complex, systems and the interactions within those systems. It provides structured processes that help to ensure designs are reliable. In this module, learners will gain an understanding of the principles and stages involved in systems analysis and the associated documentation involved in both the analysis and design stages. One key stage involves the determination of requirements and the writing of the requirements specification. Clear statements and understanding of the requirements are essential to ensuring that an appropriate solution is designed. In addition, the specification will provide the basis for later testing and evaluation.

The module looks at why organizations undertake systems analysis as well as the benefits of carrying out such a formal process. A wide variety of methodologies are used, however they are all based on similar fundamental principles.

Learners will become familiar with a limited number of lifecycle models and the associated terminology involved in the analysis and investigation of a system.Learners will develop a detailed knowledge and understanding of different methodologies and their benefits and uses in particular situations.

It is expected that learners will undertake an actual systems analysis and design activity. It is not expected, however, that learners will create the system or test it as part of this unit. Other units can be linked to this unit to carry through the design work to the implementation stage.

Learning outcomes
On completion of this module a learner should:

- Understand the principles of systems analysis and design
- Be able to carry out a structured analysis of business systems requirements
- Be able to design business systems solutions.

Module 9: Systems Analysis and Design

Time: 60 hrs
Theory: 25 hrs
Practical: 35 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Familiarize with Systems Analysis and Design	**Systems Analysis and Design** • Introduction • Roles and Skills of system analyst **System Development Life Cycle** • Planning, Analysis, Design, Implementation, Testing, Operation and Maintenance • Project Identification and Initiation **Feasibility Study** • Concept • Types • Significance	**4**	**0**	**4**
2. Select and Manage Project • Select Project • Plan project • Manage staff for project • Estimate project time and cost • Manage and control project	**Project Selection and Management** • Introduction • Project selection process • Project planning process • Staffing process • Project time and cost estimation • Project manage and control	**2**	**1**	**3**
3. Analyze System 3.1 Determine requirements • Define requirement determination • Follow process of requirement determination • Follow process of requirement elicitation • Follow requirement analysis strategies o Analyze problems o Analyze root cause o Analyze technology • Follow requirement validation techniques	**System Analysis** • **Requirement determination** o Introduction o Process • **Requirement elicitation** o Interview o Document analysis o Joint application development method o Questionnaires • **Requirement analysis strategies** o Problem analysis process o Root cause analysis process o Duration analysis process o Technologies analysis process • **Requirement validation techniques** o Document verification	**2**	**2**	**4**

3.2 Analyze use case • Develop use case • Elaborate and refine use case	**Use Case Analysis** • Elements of use case • Alternative use case formats • Use cases and testing • Building use cases • Elaborating and refining use cases	**2**	**4**	**6**
3.3 Perform Process Modeling • Create data flow diagrams • Create context diagrams • Create different levels of DFDs • Validate DFDs	**Data flow diagrams (DFD)**: • Notions of DFD • Reading and understanding DFD • Process descriptors **Creating DFD**: • Context diagrams • Different levels of DFDs • Validating DFDs	2	4	6
3.4 Develop Data Modeling • Create ER diagrams • Create data dictionary	**Data Modeling** • Concept • Entity Relation (ER) diagrams • Notions of ER diagrams • Reading and understanding ER diagrams • Process of creating ER diagrams • Cardinality and modality • Data Dictionary and Metadata	2	4	6
4. System Design **4.1 Familiarize with system design**	**System Design** • Introduction • Transition from requirements to design **System Acquisition Strategies** • Custom development • Packaged software • Outsourcing	2	0	2

4.2 Develop System Architecture • Familiarize with Elements of architecture design • Design system architecture • Identify hardware and software specification	**<u>Architecture Design</u>** **Elements of architecture design**: • architectural components, client-server architecture, client server tier, less common architectures, comparing architecture options **creating an architecture designs** • operational requirements, performance requirements, security requirements, designing the architecture; **hardware and software specification**	2	3	5
4.3 Develop User Interaction • Design input/output • Design user interface	**<u>User Interaction Design</u>** • Introduction **Principles for User Interaction design** • layout, content awareness, aesthetics, user experience, consistence, minimizing user effort **User interface design process**: • Use scenario development, interface structure design, interface standards design, interface design prototyping and validating**;** **Navigation design**: • Basic principles **Input/output design**: • basic principles, types and validation	2	4	6
4.4 Design Program • Create physical data flow diagram	**<u>Program Design</u>** • Process of transition from logical to physical models • Process of creating physical data flow diagram • Process of programs design • Structure charts • Syntax • Design guidelines • Program specification	2	4	6

4.5 Design Data Storage • Create database schema • Create database tables	**Data Storage Design** **Data storage formats**: • File, databases, selecting storage format; **Transition from logical to physical data models**: • Database schema, tables and designs; **Optimizing data storage**: • Storage efficiency, access speed, storage size, security and retrieval	1	4	5
5. Implement Designed Systems • Select programming language • Execute testing • Compile documents	**Implementation** **Managing Programming**: • Assigning programming tasks • Coordinating activities • Managing the schedule **Coding**: • Programming language selection • Candidate matrix • Coding techniques and practices **Testing**: • Test plan • Unit tests • Integration testing • System testing • Acceptance testing **Documentation**: • Types of documentation • Designing documentation structure • Writing documentation topics • Identifying navigating terms	2	5	7
Total Duration (hours)		**25**	**35**	**60**

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

- Dennis A and Wixom B – *Systems Analysis and Design, 4th Edition* (John Wiley and Sons, 2009) ISBN-10 0470400315, ISBN-13 978-0470400319
- Yeates D and Wakefield T – *Systems Analysis and Design, 2nd Edition* (FT Prentice Hall, 2003) ISBN-10 0273655361, ISBN-13 978-0273655367

Websites:

- www.freetutes.com/systemanalysis
- www.tutorialized.com/view/tutorial/Systems-Analysis/31659

Module 10: Event Driven Programming

Course Information
Module code: M10
Credit value: 10
Learning hours: 60 (15 Theory + 45 Practical)

Aim and purpose
This module aims to enable learners to develop the skills and understanding required to design and develop event driven applications.

Course Description:
Event driven programming is a very flexible way of allowing programs to respond to many inputs or events. Unlike traditional programming, where the control flow is determined by the program structure, the control flow of event driven programs is largely driven by external events. Typically, event loops are pre-programmed to continually look for information to process.

This module allows learners to become familiar with the underpinning concepts of event driven programming and subsequently to develop particular skills in an event driven language. The module starts by looking at the features of event driven programming, explores the tools and techniques used in their development and takes learners through design and program development. Learners will use a structured approach to the design and development of applications, ensuring the solution is well documented and tested thoroughly against the original user requirement.

Event handling features in many languages including Visual Basic, Visual Basic for Applications and many other systems.

Learning outcomes
On completion of this module a learner should:

- Understand the features of event driven programming
- Be able to use the tools and techniques of an event driven language
- Be able to design event driven applications
- Be able to implement event driven applications.

Module 10: Event Driven Programming

Time: 60hrs
Theory: 15 hrs
Practical: 45 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Familiarize with Event Driven Programming Concept	**Features of Event Driven Programming** • **Key features:** o Service oriented o Time driven o Event handlers o Trigger functions o Events -mouse, keyboard, HTML object, form, user interface; o Event loops o Flexibility o Suitability for graphical interfaces o Simplicity of programming; o Ease of development Examples: operating systems as event driven systems o Graphical User Interfaces (GUIs)	**2**	**0**	**2**
2. Select Programming Languages • Write program code	**Programming Languages:** • Visual Basic (VB) • Visual Basic for Applications (VBA) • ColdFusion o Integrated Development Environments (IDEs)	**2**	**2**	**4**
3. Use the Tools of an Event Driven Language • Write triggers • Use tools • Debug tools • Use different events	**Tools of an Event Driven Language** • Introduction of the different available tools • Types of triggers: key press, alarm, system event, touch screen event, mouse click • Use of tool boxes and controls	**1**	**3**	**4**

4. Use Techniques of an Event Driven Language • Declare variables • Create an event driven program • Use controls and event handlers	**<u>Techniques of an Event Driven Language</u>** • Variables: o Definition o Declaration o Scope o Constants o Data types • Techniques o Selection, loops, event handlers, triggers, objects and object properties, menus	**2**	**8**	**10**
5. Design Event Driven Applications • Determine the specification • Design an application	**<u>Event Driven Applications Design</u>** • Specification: o Input, output, processes, user need, purpose • Design: o Selecting and assigning properties to screen components o Data storage o Event procedures and descriptions	2	8	10
6. Implement Event Driven Applications • Create applications using syntax of programming language • Use different control structures • Use standards • Debug the program	**<u>Implementation of Event Driven Applications</u>** • Creation of application: • Use of development environment • Programming language syntax: selecting, declaring and initializing variable and data structure types and sizes • Constructs: selection eg if … then … else, CASE; iteration- while … do, repeat … until • Programming standards: use of comments, code layout, indentation • Debugging; data validation; error handling and reporting	2	12	14

7. Test an Application • Plan the test methods • Check the output • Check errors	**Testing of Event Driven Applications** • Test strategy • Test plan structure • Test date, expected result, actual result, corrective action • Error messages	2	6	8
8. Review and Documentation ofDesigned Application	**Designed Application Review and Documentation :** • Review**:** o Review against specifications requirements o interim reviews • Documentation**:** o User o Technical	2	6	8
Total Duration (hours)		**15**	**45**	**60**

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

- Balena F - Programming Microsoft Visual Basic 6 (Microsoft Press US, 1999) ISBN-10: 0735605580, ISBN-13: 978-0735605589
- Bond M, Law D, Longshaw A, Haywood D and Roxburgh P - Sams Teach Yourself J2EE in 21 Days, 2nd Edition (Sams, 2004) ISBN-10: 0672325586, ISBN-13: 978-0672325588
- Palmer G - Java Event Handling (Prentice Hall, 2001) ISBN-10: 0130418021, ISBN-13: 978-0130418029 Longshaw J and Sharp J - Visual J#.NET Core Reference (Microsoft Press US, 2002) ISBN-10: 0735615500, ISBN-13: 978-0735615502
- Suddeth J - Programming with Visual Studio.NET 2005 (Lulu.com, 2006) ISBN-10: 1411664477, ISBN-13: 978-1411664470
- Troelsen A - Pro C# 2005 and the.NET 2.0 Platform, 3rd Edition (Apress US, 2004) ISBN-10: 1590594193, ISBN-13: 978-1590594193

Websites

- eventdrivenpgm.sourceforge.net
- www.vbexplorer.com/VBExplorer/VBExplorer.asp
- www.vbwm.com
- ystems-Analysis/31659

Module 11: Object Oriented Programming

Course Information
Module code: M11
Credit value: 10
Learning hours: 60 (20 Theory + 40 Practical)

Aim and purpose

To enable learners to develop the skills and understanding required to design and develop object oriented applications.

Course Description:
Object oriented programming is an industry-proven method for developing reliable modular programs and is popular in software engineering. Consistent use of object oriented techniques can lead to shorter development lifecycles, increased productivity and lower the cost of producing and maintaining systems.

Programming with objects simplifies the task of creating and maintaining complex applications. Object oriented programming is a way of modeling software that maps programming code to the real world.

This module enables learners to become familiar with the underpinning concepts of object oriented programming and subsequently to develop particular skills in an object oriented language. The module starts by looking at the features of object oriented programming, explores the tools and techniques used in their development and takes learners through design and software development. Learners will use a structured approach to the design and development of applications, ensuring the solution is well documented and tested thoroughly against the original user requirement.

Object orientation is now the cornerstone of many languages; it is dominant C++, Java, the Microsoft.Net environment and many other systems.

Learning outcomes
On completion of this module a learner should:

- Understand the features of object oriented programming
- Be able to use the tools and techniques of an object oriented language
- Be able to design object oriented applications
- Be able to implement object oriented applications.

Module 11: Object Oriented Programming

Time: 60 hrs
Theory: 20 hrs
Practical: 40 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Familiarize with Object Oriented Programming	**<u>Object Oriented Programming</u>** • **Key features** o Discrete o Reusable units of programming logic o Identification of objects o Data abstraction; o Modularity o Classification o Inheritance o Polymorphism o Encapsulation o Classes o Methods o Message passing • **Programming languages** o Visual Basic.NET (VB.NET) o C++ o C# o Java o Perl o PHP (Hypertext Preprocessor)	**6**	**0**	**6**
2. Use Tools and Techniques of an Object Oriented Language • Use different predefined functions • Use templates • Use IDE	**<u>Object Oriented Language</u>** • **Tools:** o Predefined functions o Screen templates • **Techniques** o Using integrated development environment (IDE)	**1**	**4**	**5**
3. Use Different Variables	**<u>Different Types of Variables</u>** • **Global** • **Local** • **Static** • **Overloaded results** • **Instance**	**1**	**2**	**3**

4. **Design the Object Oriented Applications** • Declare objects and classes • Assign attributes • Declare dependencies and inheritance • Analyze properties of OOP • Apply inter object communication	**Object Oriented Elements** • **Classes** o Class diagram o Dependencies and inheritances o Identification attributes methods o Control of scope of attributes and methods o Inheritance o Aggregation o Association o Polymorphism o Pre-defined classes : class library, downloaded, imported • **Objects** o Constructors o Destructors o Program with reusable objects o Relationships between objects o Message passing between objects	**4**	**10**	**14**
5. Implement the Object Oriented Applications • Create applications using syntax of programming language • Use different control structures • Use standards • Debug the program	**Object Oriented Applications** • **Creation of application:** o Use of development environment o Debugging o Data validation o Error handling and reporting • **Programming language syntax:** o Selecting, declaring and initializing variable and data structure types and sizes • **Constructs:** o Selection : if … then … else, CASE o Iteration : while … do, repeat … until • **Programming standards:** o Use of comments o Code layout o Indentation	**4**	**16**	**20**

Test an Application • Plan the test methods • Check the output • Check errors	**Testing of Event Driven Applications** • Test strategy • Test plan structure • Test date, expected result, actual result, corrective action • Error messages	**2**	**4**	**6**
Review and Documentation of Designed Application	**Review and Documentation of an Designed Application:** • **Review:** o Review against specifications requirements o Interim reviews • **Documentation:** o User o Technical	**2**	**4**	**6**
Total Duration (hours)		**20**	**40**	**60**

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

- Halvorson V - Visual Basic 2008 Step by Step (Microsoft Press US, 2008) ISBN-10 0735625379, ISBN-13 978-0735625372
- Henney K and Templeman J - Microsoft Visual C++.NET Step by Step: Version 2003, 2nd edition (Microsoft Press US, 2003) ISBN-10 0735619077, ISBN-13 978-0735619074
- Kaldahl B - EZ Flash MX: Animation, Action Script and Gaming for Macromedia Flash (Trafford Publishing, 2004) ISBN-10 1412006171, ISBN-13 978-1412006170
- Lemay L and Cadenhead R - Sams Teach Yourself Java 2 in 21 Days, 4th Edition (Sams, 2004) ISBN-10 0672326280, ISBN-13 978-0672326288
- Schildt H - C++: A Beginner's Guide, 2nd Edition (McGraw-Hill Osborne, 2003) ISBN-10 0072232153 ISBN-13 978-0072232158

Websites

- java.sun.com/docs/books/tutorial/java/index.html
  oopweb.com
- www.vbwm.com
- www.vbexplorer.com/VBExplorer/VBExplorer.asp

Module 12: Database Design

Course Information
Module code: M12
Credit value: 10
Learning hours: 60 (20 Theory + 40 Practical)

Aim and purpose

The aim of this module is to enable learners to understand the features of relational databases and to develop the skills necessary to design, create, populate and test a relational database incorporating advanced features.

Course Description:

Database software is one of the most commonly used application packages in business. Many jobs involve the use of databases and for this reason employees with database skills are valued. The advantages of using a relational database are extensive, including significantly reduced data storage requirements, improved record manipulation and faster access to records. As with spreadsheets, data mining software can make use of database files to interrogate records and look for trends or unusual events.

Most organizations use databases in some way to store records, for example customer information, supplier information, employee details and financial information. These records can be searched, sorted, ordered, and cross-referenced using relational databases. Using a simplified chart tool, graphs and charts can also be created and embedded in reports. Importing and exporting data to and from databases will be practiced in this module.

To ensure that relational databases have integrity, validity and efficiency, designing the database prior to implementation is important. Failure to do this may result in a poor product. Learners will consider the validation and verification methods that can be implemented to ensure that the data stored in a database is as accurate as possible. Efficient relational database design is managed through the process of normalization and learners will be using normalization techniques to develop efficient and effective relationships between entities.

In this module learners will come to understand the features and functions of database software and use advanced features to design and implement fully-functioning relational databases to specified user requirements.

Learning outcomes
On completion of this module a learner should:

- Understand the features of relational databases
- Be able to design, create and populate a relational database
- Be able to test a relational database.

Module 12: Database Design

Time: 60 hrs
Theory: 20 hrs
Practical: 40 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Familiarize with Relational Database	**<u>Relational Database</u>** • Key Features: • Entities o Key fields o Primary keys o Foreign keys o Referential integrity o Auto incremented keys o Field attributes o Data redundancy • Attributes o field properties o data types o size o validation rules • Relationships • Benefits	**5**	**0**	**5**
2. Create Relationships • Create the relationships between entities • Draw ER diagram	**<u>Relationships and Benefits of Relational Database</u>** • Relationships o one-to-many o one-to-one o many-to-many • Benefits: o reduced data redundancy o reduced data storage o faster access o efficient updating o searching o sorting o reporting	**3**	**6**	**9**

3. Design, Create and Populate a Relational Database • Design tables • Design queries • Design data entry forms • Design reports • Design documentation • Create relationships • Create tables • Populate data • Normalize the database • Export data • Generate reports	**<u>Relational Database</u>** • Design**:** o Relationships o Tables o Queries o Data entry forms o Report o Documentation ▪ DFDs ▪ ERDs ▪ data dictionaries ▪ structured English • Creating relationships: o Normalization(first, second and third normal forms) o Modifying o Cascading updates o Cascading deletes • Query design: o Selection of data types o use of logical operators AND, NOR, NOT • Data entry forms: o Verification routines o Validation routines o Input masking o Checks for completeness o Data consistency o Data redundancy o Visual prompts o Dropdown o Combo boxes • Populate: o Data entry o Import data • Exporting data: o Query results o Report results o Destination	**4**	**16**	**20**

4. Apply Advanced Features • Create styles for fields • Maintain consistency • Customize menus and toolbars • Automate functions • Fix errors	**Advance Features** • Introduction • Styles for fields • Tables and forms • Reports • Consistency • Tool box • Customizing: o Menus and toolbars o Use show/hide functionality o Add buttons • Automated functions o Macros o Scripts o Program code • Errors: o Reasons o Data types o Poor design o Inconsistent normalization • Rectification	**4**	**8**	**12**
5. Test and Evaluate Relational Database • Design test plan • Check functionality • Check against user requirements • Check the customer acceptance • Evaluate criteria	**Relational Database Testing and Evaluating** • **Testing:** o Plan o Functionality o User requirements o Customer acceptance • **Evaluation criteria:** o Fit for purpose o Justification of features o Suggestions for improvements	**4**	**10**	**14**
Total Duration (hours)		**20**	**40**	**60**

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

- Hernandez M - Database Design for Mere Mortals: A Hands-on Guide to Relational Database Design, 2nd Edition (Addison Wesley, 2003) ISBN 0201752840
- Kroenke D - Database Concepts, 2nd Edition (Prentice Hall, 2004) ISBN 0131451413
- Ponniah P - Database Design and Development: An Essential Guide for IT Professionals: Visible Analyst Set (John Wiley & Sons Inc, 2006) ISBN 0471760943
- Ritchie C - Relational Database Principles (Thomson Learning, 2002) ISBN 0826457

Websites

- www.databasedev.co.uk

Module 13: Client Side Customization of Web Pages

Course Information
Module code: M6
Credit value: 10
Learning hours: 60 (15 Theory + 45 Practical)

Aim and purpose
The aim of this module is to ensure learners understand the fundamentals of cascading style sheets and scripting languages and are able to develop the skills required to implement web pages using these tools.

Course Description:
There is an increasing expectation that website design will adhere to web standards and that websites will consist of sophisticated, interactive web pages. This requires website designers and creators to be familiar with standard tools, techniques and languages in order to create such websites. In particular, web standards are beginning to expect mark-up to be done in XHTML, layout to be controlled by cascading style sheets (CSS) and client side interactivity by a scripting language such as JavaScript or VBScript.

XHTML is a stricter version of HTML and adheres to XML standards. CSS and JavaScript or VBScript are powerful scripting languages used to create sophisticated layouts and interactivity on web pages, respectively. A key feature of CSS Java/VBScript is that the script (code) is stored on the clients' system rather than on host server systems. As they do not need to interact with a web server, this can save resources and network bandwidth. CSS are capable of creating complex, sophisticated layouts which are easy to maintain and update across the whole website or individual pages. Java/VBScript is able to validate information that users enter into a form before it is sent to a web server for processing.

Learners will develop an understanding of the fundamental characteristics of CSS and a chosen scripting language. Learners will develop web pages with sophisticated layouts in which calculations can be performed by combining the two tools.

Learning outcomes
On completion of this module a learner should:

- Understand the fundamentals of cascading style sheets (CSS)
- Understand the fundamentals of scripting languages
- Be able to control the layout of web pages using CSS
- Be able to create interactive web pages.

Module 13: Client-side Customization of Web pages

Time: 60 hrs
Theory: 15 hrs
Practical: 45 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Apply Cascading Style Sheet (CSS) • Create HTML code • Create XHTML code • Create web pages	**<u>Cascading Style Sheet (CSS)</u>** • Introduction • Fundamentals • Characteristics of CSS • CSS framework • Technology • Connections of browser • Creating and Viewing Webpage • Organizing the pages	**4**	**12**	**16**
2. ApplyScripting Language • ApplyAlerts • Apply confirming choices • Apply prompting the user • Redirect code • Detect browser • Create rollovers • Maintain cookies • Construct syntax (dot operator) • Construct values • Declare variables • Apply operators • Apply assignments (function) • Applyloops	**<u>Fundamental of Scripting Language</u>** • Characteristics • Nature of language o Object oriented o Event driven • Objects • Methods • Handling events • Hiding scripts • Uses of scripting language o Alerts o Confirming choices o Prompting the user o Redirecting o Browser detection o Creating rollovers o Maintaining cookies • Constructs o Syntax (dot operator) o Values o Variables o Operators o Assignments o Loops	**4**	**12**	**16**

3. Layout Webpage Using CSS • Design layout • Create layout • Control Layout	**<u>Webpage Layout</u>** • Design • Graphics • Heading o Colour o Font o Font weight o Background image o Spacing o Margins o Borders • Lists o Tags o Hover effect o Navigation • Links and pseudo classes o Class order o Styling o Increasing active area • Control layout	**2**	**8**	**10**
4. Create Interactive Webpage • Design script • Write script • Implement script	**<u>Interactive Webpage</u>** • Introduction • Features • Requirement o Input o Outputs o Processing • Design o Flowchart o Pseudo code • Implement o Properties o Methods o Functions o Clocks o Calendars o Validation	3	7	10

5. Test and Evaluate Webpage • Design test plan • Check functionality • Check against user requirements • Check browser compatibility • Check the customer acceptance • Evaluate criteria	**Webpage** • **Testing:** o plan o Functionality o User requirements o Browser compatibility o Customer acceptance • **Evaluation criteria:** o Fit for purpose o Justification of features o Suggestions for improvements	**2**	**6**	**8**
Total Duration (hours)		15	45	60

Required tools and equipment: Well-equipped computer lab, multimedia projector

Indicative reading for learners

Bartlett K - Sams Teach Yourself CSS in 24 Hours, 3rd Edition (Sams, 2010) ISBN-10 0672331020, ISBN-13 978-0672331022

Castro E - HTML, XHTML, and CSS: Visual QuickStart Guide, 6th Edition (Peachpit Press, 2006) ISBN-10 0321430840 ISBN-13 978-0321430847

Cederholm D - Web Standards Solutions: The Markup and Style Handbook, 2nd Edition (FRIENDS OF ED, 2009) ISBN-10 1430219203, ISBN-13 978-1430219200

Websites

www.csszengarden.com
www.javascriptworld.com
www.w3schools.com/css/default.asp

Module 14: Data Analysis and Design

Course Information
Module code: M14
Credit value: 10
Learning hours: 60 (18 Theory + 42 Practical)

Aim and purpose
The aim of this module is to ensure that learners know modeling methodologies and understand logical data modeling in order to implement functional and accurate database systems using logical data modeling techniques.

Course Description:
Databases are the prime technique used to develop any information system used in modern business. They are also used in e-commerce and internet-based marketing systems. Therefore it is very important that developers of information systems have a detailed understanding of the data analysis and data structures involved in order to be able to develop functional and accurate systems which satisfy the needs of all users.

This module focuses on the design of data models, although the developed model will also be implemented.

Learning outcomes
On completion of this module a learner should:
1. Know modeling methodologies
2. Understand logical data modeling
3. Be able to produce logical data models
4. Be able to implement and test logical data models

Module 14: Data Analysis and Design

Time: 60 hrs
Theory: 18 hrs
Practical: 42 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Familiarize with Database Systems • Compare DBMS and flat-file storage	**Database Systems** • Database approach • Database management facilities • Three-level architecture • DBMS components • Data administration • Model vs. schema	**4**	**2**	**6**
2. Assign Relationship • Design database tables • Create tables • Populate data • Normalize database	**Relational Modeling** • **Tables** o Introduction o Tables o Normalization • **Redundant vs. duplicate data** o Elimination of redundancy o Deceptive appearances o Enterprise rules • **Determinants and Identifiers** o Determinants o Superfluous attributes o Determinacy diagram o Composite determinants o Transitive determinants • **Normalization** o Introduction o Hidden transitive dependency o Multi-valued determinacy o Normal forms o Advantages	**6**	**10**	**16**

3. Prepare Entity-Relationship Modeling • Prepare ER diagram skeleton • Apply 1:1, 1:many and many:many relationships	**<u>Entity-Relationship Model</u>** • **Introduction** o Bottom-up data modeling o Entity-relationship modeling o Entity-relationship diagram • **Properties of relationship** o Degree of a relationship o Determinacy constraints o Participation conditions o Multiplicity o Notations o Relation decomposition • **Connection traps** o Introduction o Fan traps o Chasm traps o Decomposition of complex relationships • **Skeleton ER models** o Introduction o Representation of 1:1, 1:many and many: many relationships • **Attribute assignment** o Assignment rules for 1:1, 1:many, many: many relationships o Extending skeleton model o Superfluous entity tables • **Design** o Creating ER diagram o Flexing by table Elimination o Flexing by splitting o Derivable attributes	**6**	**12**	**18**
4. Test Entity-Relationship Models • Create test cases • Execute test cases • Verify the requirements	**<u>Entity-Relationship Models</u>** *Types of testing*: • Integrity o domain of field o entity o relationship o constraint • Error o normal o erroneous o extreme *Test plan and strategy*: • Order and priority • Test data for population of database	**2**	**8**	**10**

5. Project • Prepare a detailed database design for an IT enabled organization		**0**	**10**	**10**
Total Duration (hours)		18	42	60

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

Auer D and Kroenke D – *Database Concepts, 5th Edition* (Prentice Hall, 2010) ISBN-10 0138018804, ISBN-13 978-0138018801

Avison D and Fitzgerald G – *Information Systems Development: Methodologies, Techniques and Tools, 4th Edition* (McGraw-Hill Higher Education, 2006) ISBN-10 0077114175, ISBN-13 978-0077114176

Chao L – *Database Development and Management* (CRC Press, 2006) ISBN-10 0849392381, ISBN-13 978-0849392382

Howe D – *Data Analysis for Database Design, 3rd Edition* (Butterworth-Heinemann Ltd, 2001) ISBN-10 0750650869, ISBN-13 978-0750650861

Ritchie C – *Relational Database Principles, 2nd Edition* (Thomson Learning, 2002) ISBN-10 0826457134, ISBN-13 978-0826457134

Module 15: Developing Computer Games

Course Information
Module code: M15
Credit value: 10
Learning hours: 60 (20 Theory + 40 Practical)

Aim and Purpose
The aim of this module is to ensure learners know about different types of computer game, understand the impact gaming has on society and are able to design, develop, test and document computer games.

Course Description:
There are many different types of computer games available which vary greatly in their look and feel, style, genre and complexity. Computer games can be played in a variety of ways, for example over the internet, on mobile telephones, on personal computers and on any of a wide range of mobile or static gaming platforms/consoles that are commercially available. A computer game is essentially a highly interactivesoftware application so, as with any complex piece of software, it requires suitable design, coding, testing and documentation.

This module is intended to prepare learners for the exciting and creative journey of designing, developing and testing computer game solutions using suitable tools, environments and techniques. It is an ideal starting point for learners considering a game development career path.

The module content is divided between designing game components, implementing these using an appropriate development environment, testing the game and producing suitable accompanying documentation for both the target audience and technical personnel. Although it is recognized that the implementation phase is often the most enjoyable for the developer, equal emphasis is purposely placed on design and testing to ensure that the game is as fault-free as possible and meets the needs of the original specification.

It is of equal importance that learners are aware of the social impact, positive and negative, that computer gaming has had on individuals and society as a whole. Learners will explore the issues surrounding gaming and consider some of the research that has been carried out in this area.

Learning outcomes
On completion of this module a learner should:
1. Understand the impact of the gaming revolution on society
2. Know the different types of computer game
3. Be able to design and develop computer games
4. Be able to test and document computer games.

Module15:Developing Computer Games

Time: 60 hrs
Theory: 20 hrs
Practical: 40 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Familiarize with Game Programming • Use different platforms	**Game Programming** • Introduction • Random number generator • architecture • Components • Interaction • Software Development Kits (SDKs) • Hardware • The Platforms	**5**	**5**	**10**
2. Design Game Program • Apply game architecture • Apply input devices • Apply output device • Apply layers • Apply animation • Apply identifiers • Apply loops and events • Use audio video	**Design and Architecture** • Game Architecture • Application Layer o Devices ▪ Input ▪ Output ▪ Storage o Operating System ▪ Language ▪ DLL ▪ Threads ▪ Network o Game Lifetime ▪ Core Libs ▪ Main Loop ▪ Init& Shutdown • Game logic o Game state & data structures o Physics o Events o Process manager o Command interpreter • Game view for the Human Player o Display o Audio o Input Interpreter o Process Manager • Game views for AI Agents • Networked Game Architecture	**10**	**15**	**25**

3. Develop Computer Games • Select game language • Write program code • Execute code • Debug program code • Test developed game • Compile document	**Computer Game Development** • Core**technologies** o Avoid hidden code that performs nontrivial operations. o Class hierarchies o Difference between inheritance and containment. o Abusing virtual functions. o Interface classes and factories. o Use of streams in addition to constructors to initialize objects.	**5**	**10**	**15**
4. Project Work • Develop a computer game.		**0**	**10**	**10**
Total Duration (hours)		20	40	60

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

Harbour J, Smith J and LaMothe A (editor) - Beginner's Guide to Darkbasic Game Programming (Muska&Lipman Publishing US, 2003) ISBN-10 1592000096, ISBN-13 978-1592000098

McShaffrey M - Game Coding Complete, 3rd Edition (Delmar, 2009) ISBN-10 1584506806, ISBN-13 978-1584506805

Websites

darkbasic.thegamecreators.com
darkbasicpro.thegamecreators.com
en.wikipedia.org/wiki/Game.programming
www.gamedev.net
www.gameprogrammer.com
www.gametutorials.com
www.gpwiki.org
www.talula.demon.co.uk/allegro
www.ultimategameprogramming.com

Module 16: Human Computer Interaction

Course Information
Module code: M16
Credit value: 10
Learning hours: 60 (30 Theory + 30 Practical)

Aim and purpose
The aim of this module is to ensure learners know the impact Human Computer Interaction (HCI) has on society, economy and culture provides the basic skills and understanding required to enable learners to design and implement human computer interfaces.

Course Description:
Human Computer Interaction (HCI) deals with the way people use technology. How do we give information to, and receive information from, computers and other digital devices? One of the biggest changes in the last 20 years has been the introduction of the graphical user interface and in many respects this has revolutionized the ways in which we interact with computers.

HCI is not confined to PCs. Consider a mobile phone or self-scan supermarket checkout. These have carefully designed user interfaces to make them easier and faster to use. There are a number of broad definitions of HCI and these confirm that HCI is not confined to technical computing, and that the subject crosses many boundaries. It could be included in the study of philosophy, engineering, psychology, physiology, behavior and many other areas.

Firstly, this module explores the impact of HCI on society, the economy and culture and looks at how HCI has developed and where it might be going next.

The fundamental principles involved in designing user interfaces are discussed, with particular emphasis on perception, behavior models and information processing. Specialist needs and the adaptation of interfaces to meet these varied needs will be examined.

Secondly, the module combines elements of HCI theory with learners' practical skills to enable them to design and implement user interfaces for input and output, using a programming language of choice. Learners will evaluate interfaces and measure their effectiveness both quantitatively and qualitatively.

This module could be combined with other units involving software development.

Learning outcomes
On completion of this module a learner should:

- On completion of this module a learner should:
- Know the impact of HCI on society, the economy and culture
- Understand the fundamental principles of interface design
- Be able to design and implement user interfaces

Module 16: Human Computer Interaction

Time: 60 hrs
Theory: 30 hrs
Practical: 30 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Familiarize with Human Computer Interaction (HCI)	**Human Computer Interaction** • History and development: o Early designs, o Availability of hardware, o Programmers, o Extended command line editor (CLE), o Graphical user interface (GUI) o Web user interface (WUI), o Character user interface (CUI) o Visual systems • Modern applications of software • Specialized interfaces for the visually impaired • Future development o Fully 3D interfaces, o Comprehensive voice recognition, o Thought input, o Realistic virtual reality	**4**	**0**	**4**
1.1 Familiarize with HCI Impact on Society	**The Impact of HCI on Society** • Improve usability o Reduce specialized knowledge, o Simplify input/output, o User friendliness • Domestic appliance displays • Specialized interfaces • Interfaces for hostile environments in remote control, data logging Handling • Complexity o Fly by wire, o Virtual reality, o Head up displays	**4**	**0**	**4**

1.2 **Familiarize with HCI Impact on Culture**	**The Impact of HCI on Culture** • Use of computers, laptops, mobile phones, texting • Mobile entertainment,mobile computing, • domestic appliances, • games • Psychological and sociological	**4**	**0**	**4**
2 Design Interface • Create input and output designs	**Principles of Interface Design** • Perception o Color o Luminance, 'pop out' effect; • Pattern o Proximity o Continuity o Symmetry o Similarity o Common groupings o Connectedness • Objects o Geons o Use of gross 3D shapes	**4**	**10**	**14**
2.1. Familiarize with Different Behavior Models	**Behavior Models:** • Predictive models o Reaction time o Keystroke Level Model (KLM) o ThroughPut (TP) Fitts' Law • Descriptivemodels o Key-Action Model (KAM) o Buxton's three state model o Guiard's Model • Comparison between different models	**4**	**0**	**4**
2.2. Familiarize with Information Processing	**Information Processing:** • Humans as a component • Overview of human information processing (HIP) • Overview of goals • Operators • Methods and selection (GOMS)	**4**	**0**	**4**

2.3. Design and Implement Special HCI System • Design special HCI system • Create special input output • Implement special HCI system	**Special HCI System:** • Designfor specialist uses o input or output for the visually orally, aurally or physically challenged o remote control devices o head up displays • Implement and test specialist uses	**4**	**12**	**16**
2. Test and Document • Design test plan • Check functionality • Check against user requirements • Check the customer acceptance • Compile Document	**HCI** • Testing: o plan o functionality o user requirements o customer acceptance • Documentation	**2**	**8**	**10**
Total Duration (hours)		**30**	**30**	**60**

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

- Most textbooks in this subject area are aimed at level 4 and above, but the following are of interest at this level:
- Carroll John M (Editor) - HCI Models, Theories, and Frameworks: Toward a Multidisciplinary Science (Morgan Kaufman, 2003) ISBN-10 1558608087, ISBN-13 978-1558608085
- Preece J, Rogers Y and Sharp H - Interaction Design: Beyond Human-Computer Interaction, 2nd Edition (John Wiley and Sons Ltd, 2007) ISBN-10 0470018666, ISBN-13 978-0470018668

Websites

- java.sun.com/products/jlf/ed1/dg/higa.htm
- www.ilikecake.net/hci/index.htm
- www.vhml.org/theses/nannip/HCI_final.htm

Module 17: Web Server Scripting

Course Information
Module code: M17
Credit value: 10
Learning hours: 60 (20 Theory + 40 Practical)

Aim and purpose

The aim of this module is to enable learners to understand and use web server scripting and investigate the common issues surrounding its use.

Course Description:

When designing and building websites, a key issue for developers is the amount of control they can exert over how tasks are carried out. Client-side scripting embedded in web pages can give additional functionality but, because the code is executed after the page has been loaded, there is little control and this approach can lead to hacking vulnerabilities and errors.

Web server scripting is code written 'server-side' and executed before the page is loaded. This means that complex tasks can be created and programming is generally more secure. The skills and knowledge developed in this module are particularly valuable because security and reliability are common issues for businesses.

The types of operation that can be influenced include handling files on the server, security systems such as password protection, and accessing databases. Server scripting can be used, for example, to gather statistics about the website, including how many visitors have viewed each page. Data such as this can be used to generate revenue from people wishing to advertise on a popular website.

Another function that web server scripting can relate to is the use of environmental arguments.
Learners will understand the principles of server-side web scripting and be able to create functionality using a web server script. Learners should also understand the security and ethical issues surrounding this area of IT.

Learning outcomes
On completion of this module a learner should:

- Understand the principles of web server scripting
- Be able to use web server scripting
- Understand the issues affecting web server scripting.

Module17: Web Server Scripting

Total Time: 60 hrs
Theory: 20 hrs
Practical: 40hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Familiarize with Web Server Scripting • Compare server side and client side scripting • Evaluate the combined use of client and web server scripting • Use web server scripting to identify a users' browser and screen resolution	**<u>Web Server Scripting</u>** • Introduction • Principles • Server side and client side scripting • Combined use of client and web server scripting • Use of web server scripting	6	4	10
2. Develop Programming for the Web Server • Select scripting language and Tools • Follow browser selection process • Use contextual editors • Apply file transfer protocol	**<u>Scripting Language and Tools Selection</u>** • Introduction of variety of scripting language o Active Server Pages (Asp) o Active Server Page. NET (Asp.Net) o ColdFusion Markup Language (CFML) o Practical Extraction and Reporting Language (Perl) o Java Server Pages (JSP) o Hypertext Preprocessor (PHP) • Browser selection process o Internet Explorer o Mozilla FireFox o Google Chrome • Contextual Editors o Notepad ++ (Windows) o GEDIT (Linux) o PHP Storm • File Transfer Protocol o FileZilla o Windows File Explorer	8	20	28

3. Create Scripts and Upload File • Follow the process of creating scripts • Use FTP client • Use contextual editor (Notepad ++ or gedit) • Use browser	**Coding** • Process of creating scripts • Using FTP client • Contextual editor (Notepad ++ or gedit) • Browsers	2	7	9
4. Implement, Test and Document • Develop simple login system • Develop multi user, dynamic login system • Write a code for login system • Access and test it through the browser • Document the process	**Implementation** • Code for login system • Access and test it through the browser • Document the process	2	3	5
5. Handle Error and Logs • Implement errors log using web server scripting • Create a web application to generate website statistics using web server scripting	**Errors and Logs** • Error log • Website statistics • Web application	2	6	8
Total Duration (hours)		**20**	**40**	**60**

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

- Elliot, G – Website Management (Lexden Publishing Limited, 2007) ISBN-10: 1904995217,ISBN-13: 978-1904995210

Websites

- msdn.microsoft.com/en-us/library/aa239615(VS.60).aspx
- www.build-your-website.co.uk/Server-Scripting.htm
- www.w3schools.com/

Module 18: Website Production

Course Information
Module code: M18
Credit value: 10
Learning hours: 60 (20 Theory + 40 Practical)

Aim and purpose
The aim of this module is to enable a learner to understand web architecture and the factors that affect itsperformance and to be able to design and create interactive websites.

Course Description:
The number of websites on the worldwide web has increased dramatically and competition is very high. Thismeans that designers must use increasingly sophisticated techniques to capture interest, as well as ensuringthat an appropriate company image is presented. Usability issues, such as navigation methods, must beconsidered carefully. A poorly-designed structure could result in users becoming confused or frustrated andnavigating away from the website.

The need for good web designers and developers continues to grow as more and more companies realize they must develop a web presence and keep it maintained and updated. This unit starts by exploring webarchitecture and the factors that influence websiteperformance. Learners investigate the web developmentprocess from identification of need, design, build, and test through to review.

Learning outcomes
On completion of this module a learner should:
1 Understand web architecture and components
2 Understand the factors that influence website performance
3 Be able to design websites
4 Be able to create websites

Module18: Website Production

Time: 60hrs
Theory: 20hrs
Practical: 40hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Familiarize with Web Architecture and Components	**Web Architecture:** • Internet Service Providers (ISP) • Web hosting services • Domain structure • Domain nameregistrars • Worldwide web **Web Components:** • Hardware o Web server o Mail server o Proxy servers o Routers • Software o Browser o Email **Protocols:** • Transport and addressing o TCP/IP • Application layer o HTTP o HTTPS o SMTP **Web Functionality:** • Web browser • Blogs • Online applications • Cloud computing	**4**	**0**	**4**

2. Familiarize with Website Performance	**Factors that Influence Website Performance** **User side factors:** • Download speed • PC performance factors o Browser o Cache memory o Processor speed **Server side factors:** • Web server capacity • Available bandwidth o Executions o Pageload o Number of hits • File types o Bitmap o Vector o Jpg o Gif o Wav o Mp3 o Avi o Swf **Security:** • Risks o Hacking o Viruses o Identity theft **Security protection mechanisms:** • Firewalls • Secure Socket Layers (SSL) • Adherence to standards	**4**	**0**	**4**

3. Design Websites • Create list of user requirements • Create layout • Familiarize with search engine optimization (SEO) strategies • Design mood boards • Design storyboarding • layout frames • layout tables • layout block level containers • layout inline containers • Create templates • Create color schemes • Create screen designs • Create outline of content • Develop markup languages • Develop client side scripting languages	**Websites Design** **Identification of need:** • Nature of interactivity o Online transactions o Static versus dynamic • Client needs anduser needs o Image, level of security o Development timescales o Support o Maintenance contracts o Costs o Visibility on search engines • End user need o Appropriateness of graphics o Complexity of site o Delivery ofcontent **Design tools:** • Concept designing o Mood boards o Storyboarding • Layout techniques o Frames o Tables o Blocklevel containers o Inline containers • Templates • Color schemes • Screen designs • Outline of content **Software:** • Markup languages o HTML • Client side scripting languages o JavaScript o VBScript • Features andadvantages of software languages • Software development environments	**4**	**10**	**14**

4. Create Websites • Create website layout • Create required animation and effects • Apply style and write CSS codes • Apply multimedia (image, audio, video) • Develop website template • Create website contents • Apply navigation techniques • Construct interactive tools • Test contents, navigation, hyperlinks and user environment	**WebsitesStructure:** • Layout of pages • Navigation • Format of content • Cascading style sheets (CSS) • Interactivefeatures • Images& animation **Content:** • Proofed, correct and appropriate information source • Structured for purpose o Prose o Bullets o Tables **Tools and techniques:** • Navigation diagram o Linear o Hierarchy o Matrix; • Building interactivity tools o Pseudocodefor client-server scripting o Animation o Image/audio/visual elements o Compliance with W3C • Metatagging • Cascading style sheets **Review:** • Functionality testing o User environments o Links o Navigation o Content • Check userrequirements • User acceptance • Audit trail of changes	**8**	**12**	**20**
5. Complete the Project • Build a complete website • Publish website		0	18	18
Total Duration (hours)		20	40	60

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

Towers J – *Macromedia Dreamweaver MX 2004 for Windows and Macintosh* (Peachpit Press, 2004)ISBN 0321213394

Veer E, Lowe D, Ray E, Ray D, Dean D, McCue C, Weadock E, Nielsen J, Aviram M, Lockwood S andSiddalingaiah M – *Creating Web Pages All-in-one Desk Reference for Dummies, 2nd Edition* (Jo

Module 19: Digital Graphics

Course Information
Module code: M19
Credit value: 10
Learning hours: 60 (18 Theory + 42 Practical)

Aim and Purpose
This module aims to enable learners to understand different types of digital graphics images and file formats and to be able to create, edit, modify and manipulate digital images of various types and complexity.

Course Description:
Many documents incorporate an element of graphics or graphic design. From the layout of the text, to the image used to promote a product, it is expected that there will be some form of graphic representation. Technology enables the production and reproduction of images to all scales, sizes and colors. High-capacity storage devices, digital cameras, specialist software and printers mean that high quality and appropriate images can be designed and produced more easily than before. There is now little excuse for not creating documents that use graphic images effectively.

In this module, learners will be expected to identify the technical requirements for the creation, storage and manipulation of complex artwork. They will be required to produce original images using drawing packages and also to create and edit electronically captured images. Learners will identify suitable images to enhance documents and use available tools and techniques to ensure that the finished document meets the user need.

Learners must understand and recognize the differences that file formats and sizes will make to their chosen image, for example identifying how pixilation and resizing can distort the image and looking at methods to eradicate this distortion. This may include the need to convert files from one graphic format to another and the identification of the most appropriate format in relation to the file's final use. In order to be sure that the final product meets requirements, formal checking must take place. For example, ensuring things such as the image resolution are appropriate for the intended use or checking the loading speed if the image is intended for a website. All artwork and chosen information must abide by the laws of copyright. It is essential that learners recognize the need to gain permission to reproduce the work of others and that they comply with the appropriate legislation.

Learning outcomes
On completion of this module a learner should:

- Know the hardware and software required to work with graphic images
- Understand types of graphic images and graphical file formats
- Be able to use editing tools to edit and manipulate images

- Be able to create and modify graphic images to meet user requirements.

Module 19: Digital Graphics

Time: 60hrs
Theory: 18 hrs
Practical: 42 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Familiarize with Hardware for Graphics	**Hardware for Graphics** • Graphics card features • Internal memory: cache,RAM • Processors • Other hardware: digital camera drivers and card • File storage: USB storage devices • Input devices: graphics tablet, mouse, digital camera, scanner	**4**	**0**	**4**
1.1. Familiarize with Software for Image Creation • Use different types of software • Select software for photo manipulation	**Software for Graphics** • Vector based software • Bitmap format • Photo manipulation software: • Image viewers, photo galleries, file conversion	**2**	**10**	**12**
2. Familiarize with Graphic Images and Graphical File Formats • Use different type of graphic images • Convert image into different format	**3. Types of Graphic Images and Graphical File Formats** • Graphic images: o Vector graphics o Bitmap • Comparison of file size, scaling, file format features and typical uses	**2**	**6**	**8**
4. Apply File Handling Process • Convert file in different format • Handle files • Use the different compression techniques	**File Handling :** • Conversion • Sizes • Formats • Import and export • Management • Compression techniques • Encryption	**2**	**4**	**6**

5. Edit and Manipulate Images • Create image through different mediums • Apply different software tools • Apply different effects • Edit graphical images	**Tools to Edit and Manipulate Images** **Graphic creation:** • Scanning, importing • Digital camera • Free hand draw, • Assemble shapes • Pre-existing material **Tools and techniques:** • Standard software tools • Special effects • Color • Layers • Advanced techniques	**2**	**10**	**12**
6. **Modify Graphic Images** • Identify target audience • Identify constraints • Modify according to need • Get feedback from user	**Graphic Images Modification** • User/client needs • Target audience • Constraints • Output media • Tools and techniques • User feedback	**2**	**6**	**8**
7. ReviewGraphical Image • Test image • Check user requirement • Check format • Apply guidelines and rules	**Graphical ImageReviewing:** • Client/user need • Proofing • Image resolution • File formats • Others **Legislation and guidelines:** • Ownership • Copyright • Permissions	**4**	**6**	**10**
Total Duration (hours)		**18**	**42**	**60**

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

- Adobe Creative Team - Adobe Photoshop CS5: Classroom in a Book (Adobe Press, 2010) ISBN-10 0321701763, ISBN-13 978-0321701763
- Bain S - CorelDRAW 12: The Official Guide (McGraw-Hill Osborne, 2004) ISBN-10 0072231912, ISBN-13 978-0072231915
- Kay D and Steinmetz W - Paint Shop Pro 9 for Dummies (John Wiley and Sons, 2005) ISBN-10 0764579355, ISBN-13 978-0764579356
- Kelby S - The Photoshop Elements 5 Book for Digital Photographers (New Riders, 2006) ISBN-10 0321476735, ISBN-13 978-0321476739

Website

- digital-tutorial.blogspot.com , graphicdesign.about.com, www.grafx-design.com

Module 20: Computer Animation

Course Information
Module code: M20
Credit value: 10
Learning hours: 60 (20 Theory + 40 Practical)

Aim and purpose
The aim of this module is to ensure learners understand types of animation and their uses and develop theknowledge and skills required to use software techniques to design and implement different types ofanimation.

Course Description:
Computer animation is the art of creating moving images through the use of computers. It brings togethercomputer graphics and animation techniques. Animation does not require computers, however the increasingability of computers to create and manipulate sets of images has allowed basic animation to reach new levelsof sophistication and realism.

To create the illusion of movement, a sequence of images is displayed over time and the human eye perceivesthis sequence as continual movement. The technique is at the heart of all existing technologies such astelevision and motion pictures. It is increasingly created by means of 3D computer graphics, although 2Dcomputer graphics are still widely used for low bandwidth and faster real-time needs. Only 2D graphics arerequired in this module.

Animation has become a prominent feature of the worldwide web and is used to create interest and attractattention. In this area, however, there are other factors that need to be taken into account when designingand building applications, such as the nature of the display device and the bandwidth of the connection. Aswith all computer applications learners must first identify the need, specific requirements and constraintsbefore building the solution.

Learning outcomes
On completion of this module a learner should:
1 Understand the types and uses of animation
2 Know the software techniques used in animation
3 Be able to design and implement digital animations

Module 20: Computer Animation

Time: 60 hrs
Theory: 20 hrs
Practical: 40 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Familiarize with Computer Animation • Execute different animation formats	**<u>Computer Animation</u>** • Introduction *Origins*: • Persistence of vision • Pioneers • Techniques • Traditional techniques *Types:* • Movement • Masking • morphing *Uses* • Advertising • Creative arts • Entertainment • Education *Digital animation formats* • Animated GIF • Dynamic HTML • Flash • Shockwave • Quick time • Realplayer • Silverlight	**8**	**2**	**10**

2. Apply DifferentTechniques Used in Computer Animation • Create a bouncing ball animation • Create e-cards • Convert different files format • Handle files • Apply different animation tools • Use animation software • Use animation for the web	**<u>Techniques Used in Animation</u>** *Tools*: • Frames • Layers • Controls • Tweening • Symbols • Integrating other media • Pre-loaders • Scripts *Animation software*: • Vector graphics • Bitmap graphics • Specialist software packages *Animating for the web*: • Special techniques • Email attachments • e-cards • Outputdevices *Files*: • Types • Features • Conversion • Import • Export • Management	**6**	**18**	**24**

3. <u>Design and Implement Digital Animation</u> • Create animation design • Use Text effects • Work with Sound and Video • Load and Control animation Content • Compile design document • Execute animation • Execute test cases • Compile documents	**<u>Digital Animations</u>** *Design*: • Storyboarding • Timings • Key frames • Frame numbering • Frame naming *Implement*: • Create • Test • Review • Document *Test*: • Test functionality • Debug *Review*: • Compare with original design • Suggest improvements *Document*: • Description • Purpose • Format • Target file size • Storage location • Naming • Source of images	**2**	**12**	**14**
4. Project Work • Complete digital animation project		0	12	12
Total Duration (hours)		16	44	60

Required tools and equipment: Well-equipped computer lab, multimedia projector

<u>Learning Resources:</u>

Lawson J, Blundell P, Anderson K, Smith A, Philips J, Kaye A, Jarvis A and Wasyliw B – *Information TechnologyPractitioners Book 2, 2nd Edition* (Heinemann, 2007) ISBN-10: 0435465503, ISBN-13: 978-0435465506

Parent R – *Computer Animation: Algorithms and Techniques, 2nd Edition* (Morgan Kaufmann, 2007)ISBN-10: 0125320000, ISBN-13: 978-0125320009

Module 21: Web Animation for Interactive Media

Course Information
Module code: M21
Credit value: 10
Learning hours: 60 (15 Theory + 45 Practical)

Aim and purpose
The aim of this module is to develop learners' practical skills in the creation of interactive animations designedfor web delivery. Learners will investigate web animations and explore digital animation methods. They willdevise, plan and create an animation using vector-based animation software techniques to produce animated,interactive web content.

Course Description:
Users of the worldwide web increasingly expect dynamic, visually engaging and media-rich content. Thiscan be created by designers in the form of interactive vector-basedanimations. Animations of this type arescalable, so they can be resized easily for different screen resolutions from mobile devices to the highestresolution monitors. They are also small in file size, they can stream across the internet even at dial-upmodem speeds and all internet users can download a software player that makes viewing their contentpossible. These characteristics make vector-based animations a popular choice for vibrant web content, anddesigning such sites is a thriving sector of the interactive media industry.

The unit begins with investigations into web animations, enabling learners to understand the uses of animationon the web. These investigations will cover both visual and technical research. Learners are encouraged tolook closely at interactive animations on the web to analyze their design and content. They will also investigatetechnologies associated with web animation in order to better understand how their work will run on theinternet.

Learning outcomes
On completion of this module a learner should:
1 Understand uses and principles of web animation
2 Be able to devise web animation
3 Be able to create web animation following industry practice.

Module 21: Web Animation forInteractive Media

Time: 60hrs
Theory: 15hrs
Practical: 45hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Familiarize with Web Animation	**Web Animation** • Introduction • Principles • Uses • Types	2	0	2
2. Familiarize with Animation Software • Work with animation software • Work with graphics	**Animation Software** • Introduction • Types • Applications • Approaches • Evaluation of products • Working with animation software • Working with graphics • Building graphic elements	**5**	**5**	**10**
3. Design Web Animation • Design animation plan • Apply tools and techniques • Create assets • Manipulate objects	**Web Animation** • Plan o Asset management o Work flow o Schedules • Basic tools • Objects • Animations • Assets • Advance tools • Interactivity	**2**	**10**	**12**
4. Create animation • Import files • Use text/images • Create interactive navigation • Integrate sound and video • Load and control flash Content • Change movieclip properties with actionscript	**Animation Using Flash** • Image • Sound • Video • Visual elements	**2**	**10**	**12**

5. ProduceWeb Animation • Publish documents • Integrate animation in web page using DHTML • Integrate animation in web page using XHTML • Integrate animation in web page using java applets	**Producing WebAnimation** • Audience, purpose, architecture • Design issues • Accessibility • Testing and usability • Packaging & publishing animation • Dynamic hypertext markup language (DHTML) • Extensible hypertext markuplanguage (XHTML) • Java applets	**4**	**12**	**16**
6. Project Work • Create an on-line Space Shooter Game		0	8	8
TOTAL HOURS		**15**	**45**	**60**

Required tools and equipment: Well-equipped computer lab, multimedia projector

Learning Resources:

Baylis P, Freedman A, Procter N et al – *BTEC Level 3 National Creative Media Production, Student Book*(Pearson, 2010) ISBN 978-1846906725

Baylis P, Freedman A, Procter N et al – *BTEC Level 3 National Creative Media Production, Teaching ResourcePack*(Pearson, 2010) ISBN 978-1846907371

Adobe Creative Team – *Adobe Flash CS4 Professional Classroom in a Book* (Adobe, 2008) ISBN 978-0321573827

Corsaro S and Parrott CJ – *Hollywood 2D Digital Animation* (Thompson Course Technology, 2004) ISBN 978-1592001705

Module 22: Computer Game Design

Course Information
Module code: M22
Credit value: 10
Learning hours: 60 (20 Theory + 40 Practical)

Aim and purpose
The aim of this module is to provide learners with an understanding of the underlying principles of game design.Learners will examine visual style and gameplay present in games by undertaking structured gameplay. Theywill generate game design ideas and learn about and prepare initial formal documentation to communicatethese ideas.

Course Description:
Game design is about daydreams. But these dreams must be communicated to teammembers, managersand financial backers. They must then be developed and documented for others to implement and this is amatter of engaging with some challenging realities. Consideration has to be given to identifying those uniquefeatures that will make them into playable top titles. All ideas must be recorded to provide a starting pointand a reference against which entrepreneurs can make judgments on the risk involved in investing in thedevelopment of the game.

The module aims to provide learners with an understanding of the underlying principles of game design thatdefine the way that games work. Learners must appreciate these key game attributes before applying them totheir own game ideas.

Learning outcomes
On completion of this module a learner should:
1 Understand the principles of game design
2 Be able to generate ideas for a game concept
3 Be able to prepare game design documentation
4 Be able to present a game concept to stakeholders

Module22: Computer Game Design

Time: 60hrs
Theory: 20 hrs
Practical: 40 hrs

Task/contents	Related Technical Knowledge	Time		
		Th	**Pr**	**Total**
1. Familiarize with Computer Game	**<u>Overview of Games, Gameplay, and the Game Experience</u>** • Characteristics • Categories • Social and cultural motivations • Types of computer gamer • Elements of a satisfying and enjoyable gaming experience. • Common mistakes made by game designers	**5**	**0**	**5**
2. Familiarize with Computer Game Design • Play different types of games	**<u>Evolution of Video and Computer Games</u>** • History • First electronic games. • "Golden Age" of arcade/homevideo games and key events of the era. • Evolution of home gaming systems. • Handheld and portable games • Potentials of wireless games • Next Generation Games o Console based, mobile, desktop games	**3**	**2**	**5**

3. Design Game Components • Design interface • Create interface • Prepare game tutorial	**<u>Game Components</u>** • Fundamental elements in a user interface. • Importance of input and game control mechanisms. • Importance of output and game world feedback. • Player perspectives • Importance of educating the player. • Types of game tutorials. • Importance of lighting and special effects • Use of animation • Use of video • Software used by modelers and texture artists. • "Game engine". • Basic elements of narrative structure • Character development	**3**	**8**	**11**
4. Develop Concept and Pre-Production of Game • Create an initial game concept • Develop game concept • Create a game's proposal • Create and maintain a game's design document • Compile design document	**<u>Game Development and Pre-Production</u>** • Process of creating game concept. • Sections of game's concept document. • Process of creating a game's Proposal Document. • Process of creating and maintaining a game's design document. • Various features of a design document.	**4**	**12**	**16**

5. Produce and Release Game • Create character modeling • Create basic textures • Create visual effects • Create complete design for a game.(Project work)	**Game Production andRelease** • Components for tracking a production schedule. • Challenges of creating and meeting a production schedule. • Critical phases of the production process • Strategies for marketing and selling game. • Issues involving game industry contracts. • Types of game development deals. • Impact of player-created content on the game industry. • Impact of online virtual worlds. • Impact of controversial games and game censorship. • Impact of technological advances on the future of game development	5	18	23
Total Duration (hours)		20	40	60

Required tools and equipment: well-equipped computer lab, multimedia projector

Learning Resources:

Baylis P, Freedman A, Procter N et al – *BTEC Level 3 National Creative Media Production, Student Book*(Pearson, 2010) ISBN 978-1846906725

Baylis P, Freedman A, Procter N et al – *BTEC Level 3 National Creative Media Production, Teaching ResourcePack*(Pearson, 2010) ISBN 978-1846907371

Adams E and Rollings A – *Game Design and Development (Fundamentals of Game Design)* (Prentice Hall, 2006)ISBN 978-0131687479

Atkins B – *More Than a Game: The Computer Game as Fictional Form* (Manchester University Press, 2003)ISBN 978-0719063657

Björk S and Holopainen J – *Patterns in Game Design* (Charles River Media, 2004) ISBN 978-1584503545

Crawford C – *Chris Crawford on Game Design* (F T Prentice Hall, 2003) ISBN 978-0131460997

Freeman D – *Creating Emotion in Games: The Art and Craft of Emotioneering* (New Riders, 2003) ISBN 978-1592730070

Fullerton – *Game Design Workshop: A Playcentric Approach to Creating Innovative Games* (Morgan Kaufmann, 2008) ISBN 978-0240809748