

# Bachelor of Science Degree in Information Technology

## The Curriculum

### Year One

<b>BIT1: Sem1</b>						
<b>No.</b>	<b>COURSE</b>	<b>COURSE</b>	<b>Lectures</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Hrs/wk</b>
1	CIT-180	Information Systems	2	1	0	3
2	CIT-181	Computing I	2	2	0	4
3	CIT-182	Information Technology Packages I	1	3	0	4
4	MAT-180	Algebra and Analytical Geometry	2	0	1	3
5	NET-101	LAN Design & Documentation	2	2	0	4
6	<b><i>COS-102</i></b>	<b><i>Communication Studies</i></b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>3</b>
7	ELE-100	Introduction to Electricity	3	1	0	4
		<b>Total Hours</b>	<b>14</b>	<b>9</b>	<b>2</b>	<b>25</b>
<b>BIT1: Sem2</b>						
<b>No.</b>	<b>COURSE</b>	<b>COURSE</b>	<b>Lectures</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Hrs/wk</b>
1	CIT-183	Computing II	1	3	0	4
2	CIT-184	Information Technology Packages II	1	3	0	4
3	MAT-185	Trigonometry & Calculus	3	0	1	4
4	<b><i>COS-102</i></b>	<b><i>Communication Studies II</i></b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>3</b>
5	NET-102	Routers & Networks	1	3	0	4
6	ELE-180	Basic Electronics	3	1	0	4
		<b>Total Hours</b>	<b>14</b>	<b>11</b>	<b>2</b>	<b>23</b>

## Year Two

<b>BIT2: Sem1</b>						
<b>No.</b>	<b>COURSE</b>	<b>COURSE</b>	<b>Lectures</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Hrs/wk</b>
1.	CIT-201	Advanced Programming	1	3	0	4
2.	CIT-202	Visual Programming	1	3	0	4
3.	CIT-203	Information Systems	2	0	0	2
4.	CIT-204	Numerical Analysis	2	0	1	3
5	NET-203	Switching & LAN Administration	1	3	0	4
6	ELE-280	Analogue Electronics	2	2	0	4
7	<b>COS-200</b>	<b>Communication Studies III</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>3</b>
8	CIT-205	System Analysis & Design I	3	0	1	4
		<b>Total Hours</b>	<b>14</b>	<b>11</b>	<b>3</b>	<b>28</b>
<b>BIT2: Sem2</b>						
<b>No.</b>	<b>COURSE</b>	<b>COURSE</b>	<b>Lectures</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Hrs/wk</b>
1	CIT-206	System Analysis & Design II	3	0	0	3
2	<b>MAT-204</b>	<b>Probability &amp; Statistics</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>3</b>
3	ELE-281	Digital Electronics	2	2	0	4
4	NET-204	WAN Networking	1	3	0	4
5	CIT-220	Hardware & Peripherals Configuration	1	3	0	4
6	HTM-200	eCommerce (HTML)	2	2	0	4
7	TEL-280	Telecommunications	2	1	0	3
8	<b>COS-200</b>	<b>Communication Studies IV</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>3</b>
		<b>Total Hours</b>	<b>13</b>	<b>10</b>	<b>2</b>	<b>28</b>

Year Three

<b>BIT3: Sem1</b>						
<b>No.</b>	<b>COURSE</b>	<b>COURSE</b>	<b>Lectures</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Hrs/wk</b>
1	WIN-300	Windows Operating System	2	2	0	4
2	UNIX-300	Unix Operating System (Linux)	2	2	0	4
3	TEL-380	Telecommunications	2	0	1	3
4	WEB-300	PHP & Dynamic Web Pages	2	2	0	4
5	CIT-301	Mastering Sequential Query Language (SQL)	2	2	0	4
6	NET-301	Internet & TCP/IP	2	2	0	4
7	CIT-302	Hardware Engineering II (Building a Computer Hardware System)	1	3	0	4
		<b>Total Hours</b>	<b>13</b>	<b>13</b>	<b>1</b>	<b>27</b>
<b>BIT3: Sem2</b>						
<b>No.</b>	<b>COURSE</b>	<b>COURSE</b>	<b>Lectures</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Hrs/wk</b>
1	CIT-302	Hardware Engineering III (Diagnostics)	1	3	0	4
2	PRG-303	Advanced PHP Programming	1	3	0	4
3	ACC-301	Windows-Unix interface using Samba	1	3	0	4
4	WEB-305	Website Design & Development	2	2	0	4
5	ELE-382	Micro-Electronics	2	1	0	3
6	WEB-302	Web Server Administration	2	2	0	4
		<b>Total Hours</b>	<b>9</b>	<b>14</b>	<b>0</b>	<b>23</b>

Year Four

<b>BIT4: Sem1</b>						
<b>No.</b>	<b>COURSE</b>	<b>COURSE</b>	<b>Lectures</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Hrs/wk</b>
1	PRG-480	Java Programming	1	2	0	3
2	ADM-480	Server Administration	2	2	0	4
3	DBS-480	Database Administration	2	2	0	4
4	IMG-482	Computer Graphics	1	2	0	3
5	PRJ-480	Main Project	2	8	0	10
		<b>Total Hours</b>	<b>8</b>	<b>16</b>	<b>0</b>	<b>24</b>
<b>BIT4: Sem2</b>						
<b>No.</b>	<b>COURSE</b>	<b>COURSE</b>	<b>Lectures</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Hrs/wk</b>
1	PRJ-480	Main Project	2	14	0	16
2	UNIX-400	Advanced Linux Server Administration	2	2	0	4
3	UNIX-401	Computing Security and Firewalls	2	2	0	4
		<b>Total Hours</b>	<b>6</b>	<b>18</b>	<b>0</b>	<b>24</b>

**YEAR 1 SEMESTER 1**

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Information Systems  
3 **Year** : One  
4 **Code** : CIT-180  
5 **Semester** : One  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing & Information Technology  
8 **Lecture hours per week** : 2  
9 **Practical hours per week** : 1  
10 **Method of Assessment** : 60% examinations and 40% course work

11 **Aim of Study:**

To develop the knowledge and skills in information technology in business and the basic concepts of computerised processing systems.

12 **Objectives of Study:**

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

- a) Explain the role of information technology in business.
- b) Develop simple business skills.
- c) Apply basic concepts of computerised processing systems

13 **Topics of study**

a) **Lectures**

**Role of Information Systems**

- Introduction to Information Processing
- Types of Information Systems

**Hardware Systems**

- Basic Computer System Components
- Internal processing and data representation
- Types of computer and development history
- Input, output and storage media
- Peripherals
- Telecommunication systems

**Software**

- System software
- Application software
- Computer languages

**Data Processing Options**

- Multi-user and stand-alone systems
- Data communications
- Batch and on-line systems

#### **System Development and Implementation**

- System development life cycle
- Software development

#### **Information System Management**

- Traditional data processing
- End-user management
- Computer Bureau and other service organisation

#### **Security And Controls**

- Threats to information systems
- Internal controls
- Security and privacy
- Copyright and Licensing

### **b) Practicals**

#### **Hardware Systems**

- Installation of hardware components
- Hardware testing
- Hardware upgrading
- Hardware troubleshooting

#### **Software Systems**

- Software installation
- Operating Systems
- Software testing
- Software troubleshooting

### **1.4 Recommended Text**

- Avgeron C. 1998, *Developing Information Systems*, London, Macmillan Master Series.
- Davies, P. B. 1998, *information Systems Development* (3<sup>rd</sup> Edition), , London: Macmillan Masters Series.
- Olle W., Addison-Wesley, 1991, *Information Systems Methodologies: A Framework for Understanding* (2<sup>nd</sup> Edition)
- Molland, R. 1996, *Advanced Information Technology Assignments*, Longman

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Computing I  
3 **Year** : One  
4 **Code** : CIT-181  
5 **Semester** : One  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing & Information Technology  
8 **Lecture hours per week** : 2  
9 **Practical hours per week** : 2  
10 **Method of Assessment** : 60% examinations and 40% course work  
11 **Aim of Study**  
To introduce the knowledge and skills to the students on how to develop computer programs in the problem solving
12. **Objectives of the Study**  
By the end of the course students should be able to:-  
a) understand a program as expressing a step-by-step solution ('an algorithm').  
b) understand the compiler as an information processing machine;  
c) understand programming concepts and to design situations to their problems in form of programs;
- 13 **Topics of the study**
- a) **Lectures**
- Stages of programming
  - Algorithm Development
  - Basic Data Types
  - Control Structure
  - Data Structures
  - Program Partition
- b) **Practicals**
- Problem definition
  - Flowcharting
  - Coding and testing programs
- 1.4 **Recommended Texts**
- Peckham H.D., 1979, *Programming Basic with the TI Home Computer*, , New York: McGraw-Hill.
  - Glenn Brookeshear J & Addison Wesley, 1997, *Computer Science : An Overview* (5<sup>th</sup> Edition)

- Russell L. Shackelford & Addison Wesley, *Introduction to Computing and Algorithms*, 1998
- William Buchana, *Mastering Pascal and Delphi Programming* 1998 London, MacMillan Master Series
- Horowitz E, *Computer Algorithms (Pseudocode Version)* 1997 London MacMillan Master Series
- Dewdney A K, *Introduction to Computer Science : Bits of Theory, Bytes of Practice*, 1996 London, MacMillan Master Series
- Lister A M, *Fundamentals of Operating Systems* 1998 (6<sup>th</sup> Edition) London MacMillan Master Series

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : IT Packages I  
3 **Year** : One  
4 **Code** : CIT-182  
5 **Semester** : One  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing & Information Technology  
8 **Lecture hours per week** : 1  
9 **Practical hours per week** : 3  
10 **Method of Assessment** : 60% examinations and 40% course work  
11 **Aim of Study**  
The aim of this course is to familiarise students with information technology packages
12. **Objectives of the study**  
By the end of the course students should be able to define and use:  
a) Word-processing packages  
b) Communication programmes  
c) And, Database package
- 13 **Topics of study**
- a) **Lectures**
- Word Processing**
- Define Word Processing
  - Features and facilities of practice on a word processing package available
- Communication Programs**
- Define communication programs
  - Practice working with communication programs ranging from Novell and/or Windows sessions to E-mail and Internet
- Database**
- Define a database
  - The Database Management System
  - Features and facilities of Database Software
- b) **Practicals**
- Creating and editing word documents
  - Searching information from Internet
  - Sending and receiving e-mails

- Creating simple databases

**14. Recommended Text**

- Gold R. S., 1991, *Microcomputer Applications.*, Kerper Boulevard, Wm. C. Brown Publishers (WCB).
- Ed Bott Leonhard, Woody (Editor), **Special Edition Using Microsoft Office `2000 (Special Edition Using)**
- Courter Gini, Marquis Annette, **Microsoft Office 97 : User Certification Study Guide**

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Algebra and Analytical Geometry  
3 **Year** : One  
4 **Code** : MAT-180  
5 **Semester** : One  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information Technology  
8 **Lecture hours per week** : 3  
9 **Tutorial hours per week** : 1  
10 **Method of Assessment** : 60% examinations and 40% course work

11 **Aim of Study**

To introduce the basics of elementary algebra, trigonometry and analytic geometry necessary for the study of Information Technology and calculus of functions of one variable.

12. **Objectives of Study**

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

- a) Solve algebra, trigonometry and analytic geometry problems
- b) Apply methods of algebra, trigonometry, and analytic algebra in solving IT and technical problems.

13. **Topics of Study**

**Elementary Set Theory**

- Define sets, subsets, elements, notation etc
- Use and apply Venn diagrams to practical problems
- Use De Morgan's Laws to simplify problems
- Distinguish natural numbers, integers, rational numbers, real numbers, irrational numbers, and, complex numbers and their notation.

**Numerals and Numbers Bases**

- Numerals, Binary numbers, Octal numbers, Hexadecimal numbers, Denary numbers
- Number bases arithmetic
- Binary fractions-decimals
- Standard form, Degree of accuracy
- Computer arithmetic
- Boolean Algebra and Logic gates

**Elementary Algebra**

- Intervals on the number line, inequalities and absolute value.
- Rules of exponents, roots

- Polynomials, multiplication and division of polynomials, the binomial theorem and Pascal's Triangle, completing the square and the quadratic formula. The remainder and rational roots theorems.
- The algebra of rational expression. Solution of rational equations and the idea of extraneous roots.
- Transposition of formulae usage in engineering: growth and decay (transient, current, inductance, capacitance etc).

**Elementary Analytic Geometry:**

- Graphic in Cartesian coordinates: straight lines (gradient, points of intersection, normal line etc)
- Derive and use the distance formula
- Draw graphs of quadratic functions (parabola) and find maximum or minimum of parabola using completing the square
- Draw graphs of the form  $1/x$
- Reduce graphs of the form  $y = ax^n$  to linear form and determine  $a$  and  $n$  graphically
- Graphs of  $v = x^n$ ,  $n = 3.4.5$
- Solution of simple quadratic inequalities
- Conic sections in standard position. Translation of axes.

**Exponential and Logarithmic Function:**

- Define a function, domain, range
- Graphs of exponential functions, applications on exponential growth and decay.
- $1 - 1$  and inverse functions
- Logarithmic functions and laws of logarithms, change of base theorems (e.g. with base 2, 3, and 10 rules of logarithms).
- Solution of simple exponential and logarithmic equations.

**14. Recommended Text**

- Ayres and Mendelson, *Schaum's Outline of The Theory and Problems of Differential and Integral Calculus* 3<sup>rd</sup> Edition, McGraw Hill
- Dettman John E., *Introduction to Linear Algebra and Differential Equations*, Dover
- Murray R. Spiegel, *Schaum's Outline of The Theory and Problems of Advanced Mathematics for Engineers and Scientists*, McGraw Hill
- Smithson J., *Mathematics for Electrical and Telecommunications Technicians* Volume 3, McGraw Hill
- Davies H. G. and Hicks G. A., *Mathematics for Scientific And Technical Students*, Longman

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : LAN Design and Documentation  
3 **Year** : One  
4 **Code** : NET-101  
5 **Semester** : One  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information Technology  
8 **Lecture hours per week** : 1  
9 **Practical hours per week** : 3  
10 **Method of Assessment** : 60% examinations and 40% course work  
11 **Aim of Study:**  
To develop the knowledge and skills in computer networking.  
12 **Objectives of Study:**  
By the end of the course the students should be able to:  
a) Explain the basic requirements of the Local Area Network  
b) Construct and test different network cables  
c) Set up the machines for the Local Area Network  
d) Segment LAN to improve traffic and security  
13 **Topics of study**  
**a. Lectures**
  - Computing Basics
  - The OSI Model
  - Local Area Networks
  - Electronics and Signals
  - Media, Connections and Collisions
  - Layer 2 – Concepts
  - Layer 2 –Technologies
  - Design and Documentation
  - Structured Cabling Project
  - Routing and Addressing
  - Protocols
  - The Transport Layer, The Session layer, The Presentation layer,**b. Practicals**
  - LAN Troubleshooting
  - Construction of UTP cables
  - Test for connectivity
  - Designing and Documentation of LAN14. **Recommended Text**
  - CISCO Systems, 1999, Cisco IOS 12.0 Solutions for Network Protocols, Volume II, Cisco Press, USA
  - CISCO Systems 1999, Internetworking Troubleshooting Handbook, Cisco Press, USA
  - CISCO Systems, 1999, Network Design and Case Studies, Cisco Press, USA
  - CISCO Systems, 1999, Internetworking Technologies Handbook, Cisco Press, USA

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology
- 2 **Course** : Communication Studies I
- 3 **Year** : One
- 4 **Code** : COS-100
- 5 **Semester** : One
- 6 **Presented to** : Faculty of Applied Studies
- 7 **Presented by** : Department of Computing and Information Technology

**Refer to Bachelor Degree in Engineering Year 1 – Faculty of Engineering**

UNIVERSITY OF MALAWI – THE POLYTECHNIC

SYLLABUS

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Introduction to Electricity  
3 **Year** : One  
4 **Code** : ELE-100  
5 **Semester** : One  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information Technology  
8 **Lecture hours per week** : 3  
9 **Tutorial hours per week** : 1  
10 **Method of Assessment** : 60% examinations and 40% course work  
11 **Aim of Study**  
To provide the essential background in selected topics in electricity for further studies in Information Technology.

- 12 **Objectives**  
Students should be able to:-  
a) Understand the basic concepts of electricity  
b) Apply these basic concepts to Information Technology.

- 13 **Topics of study**
- Conductors and Insulators
  - Positive and negative electricity
  - Electrons and electrostatics
  - Induction, the electroscope, electrophorus, and the ice-pail experiment.

**The Electrostatic Field**

- Laws of force between two charges i.e  $F \propto \frac{Q}{4\pi\epsilon r^2}$
- Quantity of charge
- Permittivity, electric intensity or field strength.

**Electric Potential**

- Potential in fields and energy
- Potential difference, intensity and formula
- The electron volt

**Capacitors**

- Definition and history,
- Faraday's Laws of Electrolysis
- Charging and discharging a capacitor and processes
- Capacitors in A. C. circuits, Parallel plate capacitor,
- Dielectric constant (relative permittivity) and strength, and its measurement, measurement of capacitance,

### **Current Electricity**

- Discovery and electricity current
- Ohm's Law and theory of circuits
- Mechanism of metallic conduction, Resistivity,

### **Heat and Power**

- Electrical Heating (Joule's Laws)
- Mechanism of the heating effect
- Potential difference and energy
- Electric power

### **Resistors and their Arrangement**

- Series resistors
- Resistors in parallel
- Resistance boxes
- The potential divider

### **Measuring Instruments**

- Conversion of a Milliammeter into a Voltmeter and a Ammeter
- The potential meter and its uses,
- Comparison of E.M.F.s calibration of voltmeter
- Measurement of current
- Comparison of resistances.

### **Electric E.M.F.s**

- Kirchhoff's Laws
- Wheatstone Bridge Circuit and its proofs
- Galvanometer position
- Range of measurable resistance
- The slide wire (meter) bridge
- Resistance and sensitivity of a galvanometer
- Temperature coefficient of resistance.

## **14. Recommended Textbook**

- Abbot *Ordinary Level Physics* 3<sup>rd</sup> Edition Heinemann (paperback)
- Neljon M. and Parker P., *Advanced Level Physics*, Heinemann Educational Books Ltd. London

## YEAR 1 SEMESTER 2

### UNIVERSITY OF MALAWI – THE POLYTECHNIC

#### SYLLABUS

- 1 **Programme** : Bachelor of Science in Information Technology
- 2 **Course** : Computing II
- 3 **Year** : One
- 4 **Code** : CIT-183
- 5 **Semester** : Two
- 6 **Presented to** : Faculty of Applied Studies
- 7 **Presented by** : Department of Computing and Information Technology
- 8 **Lecture hours per week** : 1
- 9 **Practical hours per week** : 3
- 10 **Method of Assessment** : 60% examinations and 40% course work
- 11 **Aim of Study**

To introduce the knowledge and skills to the students on how to develop computer programs in the problem solving
12. **Objectives of the Study**

By the end of the course students should be able to understand:-

  - a) a program as expressing a step-by-step solution ('an algorithm').
  - b) the compiler as an information processing machine;
  - c) programming concepts and to design situations to their problems in form of programs;
- 13 **Topics of the study**
  - a) **Lectures**
    - Programming Coding
      - Generations of programming language
      - Syntax and semantics
      - Program statements
    - Program testing and debugging
    - Data files
    - Program Documentation
  - b) **Practicals**
    - Coding, testing and debugging programs
    - Documenting programs
- 14 **Recommended Text**
  - Tucker A.B., Bernat A.P., Bradly W.J., Cupper R.D., 1994, k Fundamentals of Computing I-Logic Problem Solving, Programs, and Computers, (2<sup>nd</sup> Ed.), New York: McGraw-Hill, Inc.

- Glenn Brookeshear J & Addison Wesley, *Computer Science : An Overview* 1997 (5<sup>th</sup> Edition)
- Russell L. Shackelford & Addison Wesley, *Introduction to Computing and Algorithms*, 1998
- William Buchana, *Mastering Pascal and Delphi Programming* 1998 London, MacMillan Master Series
- Horowitz E, *Computer Algorithms (Pseudocode Version)* 1997 London MacMillan Master Series
- Dewdney A K, *Introduction to Computer Science : Bits of Theory, Bytes of Practice*, 1996 London, MacMillan Master Series
- Lister A M, *Fundamentals of Operating Systems* 1998 (6<sup>th</sup> Edition) London MacMillan Master Series

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : IT Packages II  
3 **Year** : One  
4 **Code** : CIT-184  
5 **Semester** : Two  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information Technology  
8 **Lecture hours per week** : 1  
9 **Practical hours per week** : 3  
10 **Method of Assessment** : 60% examinations and 40% course work

11 **Aim of Study**

To further familiarise students with information technology packages.

12 **Objectives of the study**

By the end of the course students should be able to use:-

- a) spreadsheet
- b) graphics
- c) and desktop publishing

13. **Topics of the study**

a) **Lectures**

**Spreadsheet**

- Define a spreadsheet
- Features and facilities of

**Graphics**

- define graphics
- features and facilities of

**Desk-Top Publishing**

- features and facilities of practical work on available desk-top publishing packages

b) **Practical**

- Creating different types of spreadsheet relating to engineering and business works
- Create graphics and presentations
- Publishing different publications

14. **Recommended Text**

- Hinkle Deborah, 1995, *WordPerfect 6.0 MS DOS A Professional Approach*, , New York: Macmillan/McGraw-Hill.

- Gold R. S., *Microcomputer Applications*. 1991, Kerper Boulevard, Wm. C. Brown Publishers (WCB).
- Johnson J. E., *Desktop Publishing using WordPerfect*, 1993, New York Macmillan/McGraw-Hill
- Ed Bott, Woody Leonhard(Editor), *Special Edition Using Microsoft Office 2000 (Special Edition Using)*
- Gini Courter, Annette Marquis, *Microsoft Office 97 : User Certification Study Guide*

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

1	<b>Programme</b>	: Bachelor of Science in Information Technology
2	<b>Course</b>	: Trigonometry and Calculus
3	<b>Year</b>	: One
4	<b>Code</b>	: MAT-185
5	<b>Semester</b>	: Two
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing & Information Technology
8	<b>Lecture hours per week</b>	: 3
9	<b>Practical hours per week</b>	: 1
10	<b>Method of Assessment</b>	: 60% examinations and 40% course work

**11 Aim of Study**

To strengthen the basics of elementary trigonometry studied in semester 1 and introduce the fundamentals of calculus.

**12 Objectives of the study**

**By the end of the course students should be able to:-**

- Solve trigonometry and elementary calculus problems
- Apply trigonometry and calculus in technical and IT problems

**13 Topics of the study**

- Trigonometry
- Applications of Trigonometry
- Differential Calculus
- Applications of Differential Calculus
- Integral Calculus
- Applications of the Integral:

**14. Recommended Text**

- Ayres and Mendelson *Schaum's Outline Of The Theory And Problems Of Differential And Integral Calculus* 3<sup>rd</sup> Edition, McGraw-Hill
- Dettman John W *Introduction To Linear Algebra And Differential Equations* Dover
- Davies H G & Hicks G A, *Mathematics For Scientific And Technical Students*, Longman
- Smithson J, *Mathematics For Electrical And Telecommunications Technicians* Volume 3, McGraw
- Mustoe Leslie & Wesley Addison, *Engineering Mathematics*

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

1	<b>Programme</b>	: Bachelor of Science in Information Technology
2	<b>Course</b>	: Communication Studies
3	<b>Year</b>	: One
4	<b>Code</b>	: COS-102
5	<b>Semester</b>	: Two
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing & Information Technology

Refer to Bachelor Degree in Engineering Year 1 – Faculty of Engineering

UNIVERSITY OF MALAWI – THE POLYTECHNIC

**SYLLABUS**

- 1     **Programme**             : Bachelor of Science in Information Technology  
2     **Course**                : Router and Networks  
3     **Year**                 : One  
4     **Code**                 : NET-102  
5     **Semester**            : Two  
6     **Presented to**         : Faculty of Applied Studies  
7     **Presented by** : Department of Computing and Information Technology  
8     **Lecture hours per week**   : 1  
9     **Practical hours per week**   : 3  
10    **Method of Assessment**       : 60% examinations and 40% course work  
11    **Aim of Study:**  
      To develop the knowledge and skills in router configuration, management and maintenance
- 12    **Objectives of Study:**  
      By the end of the course the students should be able to:  
      a) Explain the features of the routers  
      b) Configure the routers  
      c) Troubleshoot the router problems
- 13    **Topics of study**
- a) **Lectures**
- WANs and Routers
  - Router CLI, Components, Startup and Setup,
  - Router IOS Images, Configuration
  - TCP/IP
  - IP Addressing
  - Routing & Protocols
  - Network Troubleshooting
- b) **Practicals**
- Router configuration
  - Password recovery
  - Router troubleshooting
14.   **Recommended Text**
- CISCO Systems, 1999, Cisco IOS 12.0 Solutions for Network Protocols, Volume II, Cisco Press, USA
  - CISCO Systems, 1999, Internetworking Troubleshooting Handbook, Cisco Press, USA
  - CISCO Systems, 1999, Network Design and Case Studies, Cisco Press, USA
  - CISCO Systems, 1999, Internetworking Technologies Handbook, Cisco Press, USA

- Fred Halsall, Data Communications, Computer Networks and Open Systems, Fourth Edition, Addison-Wesley Publishing Company Inc., United Kingdom, 1996.

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Basic Electronics  
3 **Year** : One  
4 **Code** : ELE-180  
5 **Semester** : Two  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing & Information Technology  
8 **Lecture hours per week** : 3  
9 **Practical hours per week** : 1  
10 **Method of Assessment** : 60% examinations and 40% course work  
11 **Aim of Study**  
The aim of the course is to introduce the students to the basic electronics behind the PC. .

12 **Objectives of the study**

At the end of course the students will be able to:

- a. understand the operations of semiconductor devices in a PC,
- b. understand and design simple circuits for interface with a PC
- c. use Integrated Circuits (IC) and Cards that interface with a PC
- d. understand how the computer memory work

13 **Topics of Study**

**A. Lectures**

Semiconductor Principles

- Conductors, Semiconductors and Insulators
- Intrinsic Conduction
- Extrinsic conduction
- Effects of temperature on Semiconductors

The P-N Junction

- Reverse Biasing
- Reverse Breakdown
- Forward Biasing
- I-V Characteristics of the P-N Junction
- P-N Junction Diode Ratings and Parameters
- P-N circuit Analysis

P-N Diode Applications

- Voltage Rectification
- Halfwave Rectifier
- Fullwave Rectifier
- Smoothing circuits
- Voltage Regulation

- The Zener regulator

#### Bipolar Junction Transistor Theory

- BJT Structure
- Transistor Operation
- Transistor Configuration and Characteristics.
- Transistor Biasing
- Load Line Analysis of Transistor Circuits

#### Transistor Applications

- The Transistor as a switch
- The transistor as an Amplifier
- The Emitter Follower
- Small signal amplifiers
- Calculation of Current, Voltage and Power amplification.

#### **B. Practicles**

- Build and test various diode circuits
- Demonstrate the characteristics of Diodes and Transistors
- Build and test various transistor circuits

#### **14. Recommended text**

- Bernard Grob: Basic Electronics
- Tocci Ronald J: Fundamentals of Electronic Devices Tocci
- Schilling Donald L and Belove Charles: Electronic Circuits – Discrete and Integrated Schilling.

**YEAR 2 SEMESTER 1**

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology
- 2 **Course** : Advanced Programming ( C++)
- 3 **Year** : Two
- 4 **Code** : CIT-201
- 5 **Semester** : One
- 6 **Presented to** : Faculty of Applied Studies
- 7 **Presented by** : Department of Computing & Information Technology
- 8 **Lecture hours per week** : 1
- 9 **Practical hours per week** : 3
- 10 **Method of Assessment** : 60% examinations and 40% course work
- 11 **Aim of Study**  
To introduce students to advanced C++ programming language as a discipline.

**12. Objectives**

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

- a) Apply Object-Oriented programming in C++
- b) Develop visual and graphical applications
- c) Develop applications to control the hardware

**13. Topics of study**

**a) Lectures**

- Object-oriented programming
- Programme Structure
- Basic Data Types
- Declarations
- Control Structure
- Data Structures
- Introduction to Functions
- Data file management
- C++ and hardware management

**b) Practicals**

- Coding, testing and debugging a range of engineering problems

**14. Recommended texts**

- Tony Royce C, 1996, Programming An Introduction, London, Macmillan
- Chapman W A, 1998, Mastering C++ Programming, London, Macmillan
- Pardoe J P and King M J, 1997, Object Oriented Programming Using C++ London, Macmillan

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

1	<b>Programme</b>	: Bachelor of Science in Information Technology
2	<b>Course</b>	: Visual Programming
3	<b>Year</b>	: Two
4	<b>Code</b>	: CIT-202
5	<b>Semester</b>	: One
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing & Information Technology
8	<b>Lecture hours per week</b>	: 1
9	<b>Practical hours per week</b>	: 3
10	<b>Method of Assessment</b>	: 60% examinations and 40% course work
11	<b>Aims of Study</b>	To introduce students to Visual Basic programming language as a discipline.

**12. Objectives of study**

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

- a) Understand and apply the features of Visual Basic
- b) Apply Object-Oriented programming in Visual Basic
- c) Develop Graphic User Interfaces
- d) Link VB applications to other applications

**13. Topics of the study**

**a) Lectures**

- Features of Visual Basic Compiler
- Design and implementation of Graphic user interface
- Coding, testing and debugging VB applications
- Data manipulation in VB applications
- Developing graphics applications
- Linking VB applications to other applications such as Databases, Internet, Spreadsheet, Publishing

**b) Practicals**

- Design, Coding, testing, and debugging VB applications

**14. Recommended Text**

- Balena Francesco, Programming Microsoft Visual Basic .NET (Core Reference)
- Reynolds Matthew (Editor), Beginning VB.NET, Second Edition et al;
- Balena Francesco, Programming Microsoft Visual Basic 6.0 (Mps) Paperback

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

1	<b>Programme</b>	: Bachelor of Science in Information Technology
2	<b>Course</b>	: Information Systems
3	<b>Year</b>	: Two
4	<b>Code</b>	: CIT-203
5	<b>Semester</b>	: One
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing & Information Technology
8	<b>Lecture hours per week</b>	: 2
9	<b>Practical hours per week</b>	: 0
10	<b>Method of Assessment</b>	: 60% examinations and 40% course work

**11 Aims of Study**

- To provide students with fundamental principles of information processing
- To show students the role of computers in information processing.

**12. Objectives of study**

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

- a) use computers in their various fields of study
- b) explain the fundamental principles of information processing
- c) explain the role of computers in information processing

**13 Topics of study**

**Fundamentals of Information Technology**

- Definition of data processing
- Methods of processing data
- Organizations and applications of information technology

**Microcomputer Systems**

- definition of a computer, its characteristics and what it can do
- history of computers
- fundamental computer concepts: computer systems and subsystems; classes of modern computer systems
- microcomputer: hardware, software, characteristics and applications

**Data Communications and Networks**

- telecommunications
- distributed and centralised data processing
- data communications in electronic banking
- data transmission principles
- types of data communications
- network: network architecture, factors in network design

### **Information Systems**

- introduction to information systems
- files and file processing
- structure of databases
- commercial database services

### **14. Recommended Text**

- Mullins E, 1996, *Information Processing : Student Book* 3<sup>rd</sup> Edition Longman
- Daniels N C, 1994, *Information Technology: The Management Challenge* Addison-Wesley
- Corbitt T, 1994, *Information Technology and Its Applications* (2<sup>nd</sup> Edition) Longman
- Zorkoczy P, 1982, *Information Technology: An Introduction* New York : Van Norstrand Reinhold
- Bardsley W. L., 1987, *Introducing Information Technology*, Harlow: Longman
- William S Davis, 1981, *Computers and Business Information Processing*, Reading Mass : Addison-Wesley Pub. Co.
- Deitel H M and Deitel B, 1985, *Computers And Data Processing* Orland, Fla : Academic Press
- Davis G B, 1978, *Computers and Information Processing*, New York : McGraw-Hill
- Silver G A & Silver M L, 1986, *Computers And Information Processing* New York : Harper & Row

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

1	<b>Programme</b>	: Bachelor of Science in Information Technology
2	<b>Course</b>	: Numerical Analysis
3	<b>Year</b>	: Two
4	<b>Code</b>	: CIT-204
5	<b>Semester</b>	: One
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing & Information Technology
8	<b>Lecture hours per week</b>	: 2
9	<b>Tutorial hours per week</b>	: 1
10	<b>Method of Assessment</b>	: 60% examinations and 40% course work

**11 Aim of Study**

The aim of the course is to introduce students to solving problems using the computer.

**12. Objectives of study**

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

- (a) recognize problems for which a numerical approach is appropriate
- (b) approximate solutions of linear and nonlinear equations
- (c) interpolate data points with polynomials and estimate the numerical values of derivatives and integrals
- (d) numerically solve ordinary differential equations
- (e) analyze how and why the algorithms discussed work

**13. Topics of study**

- Computer arithmetic and errors.
- Algorithms and programming for numerical solutions.
- Basic algorithms.
- Iterative solutions of nonlinear equations: bisection method, Newton's method, the secant method.
- Polynomial interpolation and other interpolation functions, spline interpolation, trigonometric interpolation and fast Fourier transform, systems of linear equations, partial pivoting, matrix factorization methods.
- Numerical calculus: numerical differentiating, interpolatory quadrature, richardson extrapolation and romberg integration.
- Gaussian integration.
- Numerical solutions of differential equations
- Boundary value problems: shooting method. Finite difference method
- Power and inverse power methods.

**14. Recommended Text**

- Isaacson Eugene, Keller Herbert Bishop, Analysis of Numerical Methods, Paperback
- Burden Richard L, Faires J Douglas, Numerical Analysis

- Gerald F Curtis, Wheatley Patrick O, ( Hardcover-November 1998.) Applied Numerical Analysis (6th Edition)
- Cheney E Ward, Kincaid David R, Numerical Mathematics and Computing (Hardcover)
- Hoffman Joe D, (Hardcover- September 2001), Numerical Methods for Engineers and Scientists .

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Switching and LAN Administration  
3 **Year** : Two  
4 **Code** : NET-203  
5 **Semester** : One  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information  
Technology  
8 **Lecture hours per week** : 1  
9 **Practical hours per week** : 3  
10 **Method of Assessment** : 60% examinations and 40% course work

11 **Aim of Study:**

To develop the knowledge and skills in the switch configuration and management

12 **Objectives of Study:**

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

- a) Explain the basic features of the switch
- b) Configure the switch
- c) Create the Virtual LAN on the switch

13 **Topics of study**

a) **Lectures**

- LAN Switching
- Virtual LANs
- LAN Design
- Routing Protocols: IGRP
- Access Control Lists (ACLs)
- Novell IPX
- Network Management
- Network Troubleshooting

b) **Practicals**

- Configure the switch
- Troubleshoot the switch
- Create Virtual LAN
- Create Access Control Lists

14. **Recommended Text**

- CISCO Systems, Cisco IOS 12.0 Solutions for Network Protocols, Volume II, Cisco Press, USA, 1999

- CISCO Systems, *Internetworking Troubleshooting Handbook*, Cisco Press, USA, 1999
- CISCO Systems, *Network Design and Case Studies*, Cisco Press, USA, 1999
- CISCO Systems, *Internetworking Technologies Handbook*, Cisco Press, USA, 1999
- Fred Halsall, *Data Communications, Computer Networks and Open Systems*, Fourth Edition, Addison-Wesley Publishing Company Inc., United Kingdom, 1996.

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Analog Electronics  
3 **Year** : Two  
4 **Code** : ELE-280  
5 **Semester** : One  
6 **Presented to** : Faculty of Applied Studies

Presented by: Department of Computing and Information Technology

- 8 **Lecture hours per week** : 2  
9 **Practical hours per week** : 2  
10 **Method of Assessment** : 60% examinations and 40% course work

**11 Aim of Study**

To develop skills and knowledge required to understand microprocessor based systems and microcomputers

**12. Objectives of study**

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

- a) select diodes for a range of applications using manufacturer's data
- b) use unipolar and bipolar transistors in electronic switching circuits
- c) design and test a single stage amplifier
- d) test a series voltage regulator and report on its performance
- e) understand the electronic operation and test the function of combinational logic gates
- f) design, assemble and test logic circuits to meet a given specification
- g) understand the electronic operation and test the logic function of elementary sequential circuits

**13 Topics of study**

**Semiconductor Diodes**

- Properties of pure silicon, n-type silicon and p-type silicon
- The operation of a p-n junction under forward and reverse bias conditions
- The characteristics of signal diodes, power diodes and zener diodes by reference to manufacturers' data sheets
- Use a CRO to investigate the operation of a simple d.c power supply consisting of a step-down transformer, bridge rectifier and smoothing circuits
- Report on the test above and comment on regulation and ripple effects

**Analog components**

- Resistors and capacitors
- Alternating current circuit
- Diodes, transistors, voltage regulators, and opto-isolators

**Transistors**

- Describe the d.c operation of unipolar and bipolar transistors
- Compare the characteristics of unipolar and bipolar transistors using manufacturers' data sheet
- State that a typical value for base-emitter voltage will be in the range 0.6 to 1.0 V, depending on the type and rating of the device
- Describe the switching action of unipolar and bipolar transistors using manufacturers' data sheets
- Use the manufacturers' data sheets to design a simple transistor electronic switch for controlling a lamp
- Construct, test and report on circuit designed above.

### **Amplifiers**

- Describe the operation of Class A small-signal single-stage unipolar and bipolar transistor amplifier
- Describe the simple model of a transistor based on input resistance ( $r_{in}$ ) and mutual conductance ( $g_m$ ). Extend the model to represent a resistance-loaded amplifier
- State that for practical purposes  $g_m = (1_c/25)mS$  where  $1_c$  is measured in mA
- Calculate the gain of a resistance-loaded amplifier from given parameters
- Define the term bandwidth
- Use manufacturers' data sheets to design a simple Class A single-stage amplifier with resistive load to satisfy a given specification
- Construct and test the Class A single-stage amplifier with resistive load and report.

### **Operational Amplifiers**

- Negative feedback
- Op-amp circuits and real-op-amp behaviour
- Effect of feedback on op-amp parameters
- The instrumentation amplifier
- The sample and hold amplifier
- Comparators

### **Stabilized Power**

- Explain the need for stabilization of d.c. power supplies
- Explain the operation of a series voltage regulator which uses two transistors and a Zener diode
- Test the circuit described in above and report on its performance
- Use manufacturers' data sheet to select an integrated-circuit voltage regulator to meet a given specification

## **14. Recommended Text**

- Milnes A, G., *Semi-conductor Devices and Integrated Electronics* Longman
- Green D C, *Electronics II* McGraw-Hill
- Stanley Principles of Electronic Devices

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

1	<b>Programme</b>	: Bachelor of Science in Information Technology
2	<b>Course</b>	: Communication Studies
3	<b>Year</b>	: Two
4	<b>Code</b>	: COS-200
5	<b>Semester</b>	: One
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing & Information Technology

Refer to Bachelor Degree in Engineering Year 2 – Faculty of Engineering

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Systems Analysis & Design I  
3 **Year** : Two  
4 **Code** : CIT-205  
5 **Semester** : One  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information Technology  
8 **Lecture hours per week** : 3  
9 **Tutorial hours per week** : 1  
10 **Method of Assessment** : 60% examinations and 40% course work  
11 **Aim of Study**  
To equip students with a systematic approach to understanding analysis and design of computer systems.

**12. Objectives of study**

By the end of the course students should be able to understand:-

- a) understand computer systems
- b) analyse systems and identify faults and shortfalls
- c) design new and maintain old systems follow the systematic procedures

**13. Topics of study**

**Systems Analysis**

- The scope, purpose and methods of systems analysis
- The system life cycle and its stages
- The role of the participants
- The systems analyst: qualities, qualifications and experience

**14. Managing Systems Development**

- project planning and control – principles and methods
- justifying the new system
- quality assurance

15

**Systems Analysis Techniques**

- Initiation, terms of reference, investigation methods – records, interviews, questionnaires, observation, sampling
- Human factors and behaviour
- Techniques and tools of analysis: data flow diagrams, entity models and Data dictionaries
- Recording facts and the full study report

**16. Recommended Text**

- Skidmore S, 1997, *Introducing Systems Design*, (2<sup>nd</sup> Edition) London : Macmillan Master Series

- Tudor T, 1997, *Systems Analysis and Design : A Comparison of Structured Methods*, London, Macmillan Master Series
- Skidmore S, 1997, *Introducing Systems Analysis (2nd Edition)* London : Macmillan Master Series
- Dhillon G, 1997, *Managing Information Systems Security*, London : Macmillan Master Series

## YEAR 2 SEMESTER 2

### UNIVERSITY OF MALAWI – THE POLYTECHNIC

#### SYLLABUS

1	<b>Programme</b>	: Bachelor of Science in Information Technology
2	<b>Course</b>	: Systems Analysis & Design II
3	<b>Year</b>	: Two
4	<b>Code</b>	: CIT-206
5	<b>Semester</b>	: Two
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing and Information

Technology

8	<b>Lecture hours per week</b>	: 3
9	<b>Practical hours per week</b>	: 0
10	<b>Method of Assessment</b>	: 60% examinations and 40% course work

#### 11 Aim of Study

To further equip students with a systematic approach to understanding, analysis and design of computer systems.

#### 12 Objectives of study

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

- Understand computer systems or display their understanding
- Analyse systems and identify faults and shortfalls
- Design new and maintain old systems following the systematic procedures

#### 13. Topics of study

##### System Design Techniques

- the system outline – output, input, files and processes
- system flowcharts
- procedure flowcharts
- modes of operation
- human/computer interface
- system documentation to agreed standards

#### 14 System Controls and Security

- physical and technical security
- control of access
- audit methods
- legal requirements – the data protection act

#### 15 Implementation

- coding and coding styles
- data conversion
- staff training
- changeover methods, testing and acceptance
- project review : compliance with specification, performance, financial benefit, development and support

#### 16 Introduction To Structured Systems Analysis And Design

- purpose and principles of SSADM

- typical stages in a project
- the tools of structured analysis
- the separation of the logical and physical design
- practical use of one method such as Your don-Constantine, Demarco or Learnmoth and Burchett (SSADM)

**117. Recommended Text**

- Skidmore S, *Introducing Systems Design* (2<sup>nd</sup> Edition) London Macmillan Master
- Tudor T, 1997, *Systems Analysis and Design: A Comparison of Structured Methods*, London, Macmillan Master Series
- Skidmore S, 1997, *Introducing Systems Analysis*, (2<sup>nd</sup> Edition) London, Macmillan Master Series
- Dhillon G, 1997, *Managing Information Systems Security*, , Macmillan Master Series

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

1	<b>Programme</b>	: Bachelor of Science in Information Technology
2	<b>Course</b>	: Probability and Statistics
3	<b>Year</b>	: Two
4	<b>Code</b>	: MAT-204
5	<b>Semester</b>	: Two
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing and Information

Technology

8	<b>Lecture hours per week</b>	: 2
9	<b>Tutorial hours per week</b>	: 1
10	<b>Method of Assessment</b>	: 60% examinations and 40% course work

11 **Aim of Study**

To develop probabilistic, combinatorial, and mathematical expectation skills necessary for statistical, operations research and discrete mathematical problems

12. **Objectives of study**

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

- understand a range of probabilistic and statistical techniques and their applications in the analysis and interpretation of data
- develop the skill of using statistical and graphical means to display the results of such analyses or to present related data in a manner which is understandable
- cultivate the capacity to formulate a problem in mathematical terms and, having solved the problem, be able to interpret the results.

13. **Topics of study**

**Sets of Probability**

- The concept of a set
- Subsets, universal sets, and Empty sets
- Venn diagrams, Set operations
- Theorem involving sets
- Principle of duality
- Random Experiments
- The concept of Probability
- The axioms of theorems
- Conditional probability
- Independent and dependent events
- Bayes' Theorem and rule
- Introduction to Combinatorics

**Random Variables and Probability distributions**

- Random variables and discrete probability distributions

- Distribution functions for discrete random variables
- Continuous probability distributions and distribution functions for continuous random variables
- Leibnuiz's rule
- Joint distributions, independent random variables and change of variables

#### **Mathematical Expectation**

- Definition
- Function of random variables and theorems of expectation
- The variance and standard deviation and their theorems
- Standardised random variables
- Moments and moment generating functions and their theorems
- Variance, covariance and correlation coefficients for joint distributions
- Law of large numbers
- Other measures of central tendency
- Percentiles, other measures of dispersion, skewness and kurtosis

#### **Special Probability Distributions**

- The Binomial and Bernoulli distributions
- The Poisson distribution
- Relationship between Binomial and Poisson distribution
- Normal distribution
- The central limit theorem
- The multinomial, Hypergeometric, uniform, Cauchy, Gamma, Beta,
- Chi-square, Student's t, and The F-Distributions and their relationships
- The Bivariate normal distributions.

#### **14. Prescribed Text:**

- Spiegel, M. R., *Theories and Problems of Probability and Statistics*, 1994, Schaum's Outline Series, McGraw-Hill Inc.

#### **15. Recommended Texts:**

- Wonnaccott, T. H. and Wonnacott, R. J., 1990, *Introductory Statistics for Business and Economics* (4th ed.), John Wiley & Sons, New York
- Francis, A., 1995, *Business Mathematics and Statistics* (4th ed.) DP Publications, London
- Levin, R. I., 1981, *Statistics for Management* (2nd ed.) Prentice/Hall International Inc, London
- Hamburg, M., 1991, *Statistical Analysis for Decision Making* (4th ed.), HBJ Publishers, London

## UNIVERSITY OF MALAWI – THE POLYTECHNIC

### SYLLABUS

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Digital Electronics  
3 **Year** : Two  
4 **Code** : ELE-281  
5 **Semester** : Two  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information Technology
- 8 **Lecture hours per week** : 2  
9 **Practical hours per week** : 2  
10 **Method of Assessment** : 60% examinations and 40% course work  
11 **Aim of Study**  
To develop skills and knowledge required to understand microprocessor based systems and microcomputers.

#### 12. Objectives of study

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

- test a series voltage regulator and report on its performance
- understand the electronic operation and test the function of combinational logic gates
- design, assemble, and test logic circuits to meet a given specification
- understand the electronic operation and test the logic function of elementary sequential circuits

#### 13 Topic of study

##### A. Lectures

##### **Digital Logic**

- Logic levels, simple gates, and truth tables
- Flip-flops
- Timing diagrams
- Logic building blocks
- Serial data transmission
- Table of TTL gates

##### **Combinational Logic Gates**

- Draw the logic symbols, BSI and ANSI, produce a truth table and a Boolean expression for AND, OR, NOT, NAND and NOR gates
- Explain reasons for using integrated circuits in logic systems
- Use manufacturers' literature to verify that the NAD, OR, NOT, NAND and NOR gates appear in multiple form in commercial ICs
- Explain that the ICs are produced using different technologies and why it is normally preferable for a given circuit to use components of one type only

##### **Combinational Logic Networks**

- Derive truth tables and the corresponding Boolean expressions from problem descriptions involving up to three variables

- Minimize
- The Boolean expression using Karnaugh maps and draw the corresponding logic diagrams
- Select from manufacturers' literature standard TTL and CMOS logic gates and connect and test the circuits above

### **Sequential Logic Systems**

- Distinguish between combinational and sequential systems

### **B. Practicals**

- Build and test a simple logic circuit (e.g. diode-resistor) that will provide one of the logic functions above and verify that logic states in a practical circuit are represented by a band of voltages rather than a single value (e.g. logic 0 = 0V – 1V, logic 1 = 4V – 5V)
- Using TTL or CMOS two-input gates, verify by experiment
- Demonstrate De Morgan's theorem for up to three variables by:
- Construct and test the electronic and logic behaviour of:
  - \* a discrete component R –S flip-flop
  - \* 2NOR gate flip-flops
  - \* 4NAND gate flip-flop
- Investigate practically the operation of IC, J-K and D-type flip-flops
- Construct and test the operation of a:
  - \* 3 stage binary counter
  - \* 3 stage shift registerusing either J-K or D-type flip-flops.

## **14. Recommended Text**

- Morris Mano M. Digital Design (2<sup>nd</sup> Edition)
- Rabaey Jan M, Digital Integrated Circuits (2nd Edition) et al (Hardcover)
- Smith Steven W, Digital Signal Processing: A Practical Guide for Engineers and Scientists Paperback
- Lyons Richard G, Understanding Digital Signal Processing Hardcover, Rabaey Jan M, Digital Integrated Circuits (2nd Edition) et al (Hardcover)

## UNIVERSITY OF MALAWI – THE POLYTECHNIC

### SYLLABUS

1	<b>Programme</b>	: Bachelor of Science in Information Technology
2	<b>Course</b>	: WAN Networking
3	<b>Year</b>	: Two
4	<b>Code</b>	: NET-204
5	<b>Semester</b>	: Two
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing and Information

Technology

8	<b>Lecture hours per week</b>	: 1
9	<b>Practical hours per week</b>	: 3
10	<b>Method of Assessment</b>	: 60% examinations and 40% course work

#### 11 **Aim of Study:**

To develop the knowledge and skills in the Wide Area Network configuration and management

#### 12 **Objectives of Study:**

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

- Explain the basic requirements of the Wide Area Networks (WANs)
- Design and document the Wide Area Network
- Set up the protocols on the router for WAN services
- Maintain the WAN

#### 13 **Topics of study**

##### a. **Lectures**

- Wide Area Network basics
- WAN Design
- Point-to-Point Protocol (PPP)
- Integrated Services Digital Networks (ISDN)
- Frame Relay
- Network Management

##### b. **Practicals**

- Setup the WAN protocols
- Configure the routers for WAN services

#### 14. **Recommended Text**

- CISCO Systems, 1999, Cisco IOS 12.0 Solutions for Network Protocols, Volume II, Cisco Press, USA
- CISCO Systems, 1999, Internetworking Troubleshooting Handbook, Cisco Press, USA
- CISCO Systems, 1999, Network Design and Case Studies, Cisco Press, USA

- CISCO Systems, 1999, Internetworking Technologies Handbook, Cisco Press, USA
- Fred Halsall, 1996, Data Communications, Computer Networks and Open Systems, Fourth Edition, Addison-Wesley Publishing Company Inc., United Kingdom

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

1	<b>Programme</b>	: Bachelor of Science in Information Technology
2	<b>Course</b>	: Hardware and Peripherals Configuration
3	<b>Year</b>	: Two
4	<b>Code</b>	: CIT-220
5	<b>Semester</b>	: Two
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing and Information Technology
8	<b>Lecture hours per week</b>	: 1
9	<b>Practical hours per week</b>	: 3
10	<b>Method of Assessment</b>	: 60% examinations and 40% course work

**11. Aim of Study**

Learn the skills necessary to configure a Windows based PC

**12. Objectives of study**

By the end of the course students should be able to

- a) Setup computer hardware for Operating System Installation.
- b) Configure Cards and peripherals of the Computers
- c) Troubleshoot hardware faults

**13. Topics of study**

• **internal or external computer components:**

1. CPUs and sockets
2. Bus architectures
3. Expansion slots
4. RAM, ROM and CACHE
5. Motherboards
6. Power supplies
7. CMOS
8. Serial ports
9. Comm ports
10. Parallel port
11. Batteries
12. Speakers
13. I/O cards, controllers
14. Sound, sound cards
15. FDDs
16. HDDs
17. CD-ROM, CD-RW
18. Connector cables
19. Mouse types / connections
20. Keyboard connections

• **start-up sequence:**

1. CONFIG.SYS
2. AUTOEXEC.BAT

3. WIN.INI
  4. SYSTEM.INI
  5. Windows Registry
- **basic PC troubleshooting procedures,**
  - **File types: \*.COM, \*.EXE, \*.BAT, \*.BAK, \*.INI, \*.WAV**

**B. Practicals**

- **maintenance and upgrading activities:**
  1. adding RAM
  2. replacing BIOS battery
  3. SETUP utility / CMOS configuration
  4. adding second HDD
  5. replacing FDD
  6. installing CD-ROM, CD-RW
  7. FDISK & FORMAT
  8. SYS utility
  9. file attributes / hidden files
  10. Plug-n-Play / IRQs
  11. Downloading drivers, information, and plug-ins
  12. Network Interface Cards
- **monitors and video cards:**
  1. sizes 15", 17", 19" and larger
  2. types, digital, analog, interlaced, non-interlaced
  3. vertical refresh rate vs flicker
  4. resolution
  5. ISA, PCI
  6. video memory vs resolution & color depth
  7. monitor troubleshooting and maintenance
- **installation and removal of software**

**14. Recommended Text**

- Woram John, PC Configuration Handbook: A Complete Guide to Assembling Enhancing, and Maintaining Your PC
- Woram John , PC Configuration Handbook : A Complete Guide to Troubleshooting, Enhancing, and Maintaining Your PC
- Buckley Fletcher J, Implementing Configuration Management : Hardware, Software, and Firmware

## UNIVERSITY OF MALAWI – THE POLYTECHNIC

### SYLLABUS

1	<b>Programme</b>	: Bachelor of Science in Information Technology
2	<b>Course</b>	: eCommerce (HTML)
3	<b>Year</b>	: Two
4	<b>Code</b>	: HTM-200
5	<b>Semester</b>	: Two
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing and Information

Technology

8	<b>Lecture hours per week</b>	: 2
9	<b>Practical hours per week</b>	: 2
10	<b>Method of Assessment</b>	: 60% examinations and 40% course work

#### 11 Aim of Study

The aim of the course is to introduce students to the world of eCommerce.

#### 12 Objectives of study

At the end of the course students will be able to

- understand the relationship between eMarket, eBusiness and eCommerce
- design and implement eCommerce websites

#### 13 Topics of study

##### 1. Electronic Commerce – An overview

- What is Electronic Commerce (EC)? Setting the context to EC
- Related terminologies- E markets, E Business, Web-Commerce
- The ever-widening impact of EC
- Types of EC – Business-to-Business (B2B), Business-to-Commerce (B2C), Commerce-to-Business (C2B)
- Government participation in EC
- The EC bandwagon -why should businesses get on it?

##### 2. Inter- organizational applications of EC

- Financial applications
- Applications in procurement
- Business to Consumer EC
- Home shopping
- Home banking
- Education and Training
- Home entertainment
- Digital Currency and Electronic Catalogues
- Publishing
- Hypertext Markup languages

##### 3. Planning and implementing EC(1)

- EC business models
- Developing an EC business case
- EC implementation strategies

##### 4. Security Issues and solutions

- Secure Commerce requirements
- Threats
- Security strategies
- Approaches to safe EC
- Secure Protocols
- Secure Transactions
- Secure Payments
- Certificates for Authentication
- Security on web servers and Enterprise Networks

## **B. Practicals**

### 5. Creating an EC Website - Lab session 1

- Approaches to web page creation
- Design Considerations
- Introduction to HTML, Forms and Frames using a modern Web page editor

## **14. Recommended text**

- Plant Robert T, eCommerce: Formulation of Strategy Paperback
- May Paul (Author), The Business of eCommerce: From Corporate Strategy to Technology
- Shaw Jack, Sperry Judy(Editor) eCommerce for Banks, Credit Unions and Insurance Companies : An Overview
  
- Castro Elizabeth HTML for the World Wide Web with XHTML and CSS: Visual QuickStart Guide, Fifth Edition
- Musciano Chuck, Kennedy Bil, HTML & XHTML: The Definitive Guide, Fifth Edition
- Goodman Danny, Dynamic HTML: The Definitive Reference (2nd Edition)

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

1	<b>Programme</b>	: Bachelor of Science in Information Technology
2	<b>Course</b>	: Telecommunications
3	<b>Year</b>	: Two
4	<b>Code</b>	: TEL-280
5	<b>Semester</b>	: Two
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing and Information Technology
8	<b>Lecture hours per week</b>	: 3
9	<b>Practical hours per week</b>	: 1
10	<b>Method of Assessment</b>	: 60% examinations and 40% course work

**11 Aim of Study**

To introduce to students to the properties of various transmission media available to digital network systems

**12 Objectives of study**

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

- understand the major properties of various transmission media available to digital network systems
- make the best choice of an appropriate transmission media for a particular application

**13 Topics of study**

**A. Lectures**

**Signals**

- Types of signals
- Properties of signals
- Bandwidth requirements

**Transmission media**

- guided transmission systems
- unguided transmission systems
- transmission lines
- microwaves
- optical fibre transmission principles

**B. Practicals**

**Two-port network**

- characteristics
- matching and terminating

**14 Recommended text**

- Dodd Annabel Z, The Essential Guide to Telecommunications (3rd Edition) Paperback

- Cave Martin (Editor), Handbook of Telecommunications Economics et al; Hardcover
- Shepard Steven, Telecom Crash Course, Paperback
- Giralt Paul, Troubleshooting Cisco IP Telephony, et al (Hardcover)
- Goleniewski Lillian, Telecommunications Essentials (Paperback)
- Davidson Jonathan, Voice over IP Fundamentals, et al (Hardcover)

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

1	<b>Programme</b>	: Bachelor of Science in Information Technology
2	<b>Course</b>	: Communication Studies IV
3	<b>Year</b>	: Two
4	<b>Code</b>	: COS-200
5	<b>Semester</b>	: Two
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing and Information Technology

**Refer to Bachelor Degree in Engineering Year 2 – Faculty of Engineering**

**YEAR 3 SEMESTER 1**

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Windows Operating System  
3 **Year** : Three  
4 **Code** : WIN-300  
5 **Semester** : One  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information Technology  
8 **Lecture hours per week** : 2  
9 **Practical hours per week** : 2  
10 **Method of Assessment** : 60% examinations and 40% course work

**11 Aim of Study**

To introduce students to Operating Systems (OS) and develop an understanding of the role of the OS in the computer.

**12. Objectives of study**

By the end of the course students should be able to

- a) Explain the role of the operating system in the computer system
- b) Use windows operating systems effectively
- c) initialise a new PC by putting the Operating System
- d) configure the new machine
- e) initialise and configure all cards on the system
- f) add and configure most commonly used application packages

**13. Topics of study**

**A. Lectures**

Definitions of terminology used in the operating system  
Functions of an operating system

**File systems**

- File concept, support and protection
- Access and allocation methods
- Directory systems

**Central Processing Unit (CPU) Scheduling**

- Multi programming
- Scheduling algorithms and concepts
- Algorithm evaluation
- Multiple processor scheduling

**Memory Management**

- Paging and swapping
- Multiple partition and segmentation
- Process management and memory

**Customizing the Operating system**

- Personalizing the Computer
- Connecting to & Using the Internet

- E-mail, Messaging, & Faxing
- Games, Sound, & Video
- Programs, Files, & Folders

**Fixing a problem**

- Use System Restore
- Get Assisted Support
- Find a topic in the Index
- Search Online Support

**B. Practicals**

- Creating a boot disk
- Installing a new operating system
- Configuring the new operating system
- Installing drivers
- Configuring new cards

**14. Prescribed Text**

Online Study notes from Microsoft

**15. Recommended Text**

- Peterson J. L., Operating System Concepts, 2<sup>nd</sup> Edition, Addison-Wesley Publishing Company, Inc. Canada
- Microsoft Windows 2000 Scripting Guide by Microsoft, Microsoft Corporation (Paperback)
- Chellis Jim, (Hardcover-August 2001), MCSE: Windows 2000 Core Requirements (2nd Edition) et al
- Charles Petzold, (Hardcover January 1999), Programming Windows, The Definitive Guide to the Win32 API

**YEAR 3 SEMESTER 1**

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Unix Operating System (Linux)  
3 **Year** : Three  
4 **Code** : WIN-300  
5 **Semester** : One  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information Technology  
8 **Lecture hours per week** : 2  
9 **Practical hours per week** : 2  
10 **Method of Assessment** : 60% examinations and 40% course work  
11 **Aim of Study**

To introduce students to the Operating System (OS) and develop an understanding of the role of the OS in the computer.

**12. Objectives of study**

By the end of the course students should be able to

- a) Explain the role of the operating system in the computer system
- b) Use the Linux Operating Systems effectively
- c) initialise a new PC by putting the Linux Operating System
- d) configure the new machines in the Unix environment
- e) initialise and configure all cards on the system
- f) add and configure most commonly used application packages on Linux

**13. Topics of study**

**A. Lectures**

**Introduction**

- What Linux is, the Unix philosophy
- Logging in, typing commands, logging out
- Files, directories and paths
- Creating files with a text editor
- Viewing files, Managing files, Magic dot files and hidden files, Managing directories Documentation for commands Useful shell features (command-line editing, command line completion, history)

**The Unix and Linux command line**

- Unix shells (bash)
- Command line syntax (options, arguments)
- Shell variables and environment variables, Command substitution, Using pipes to connect programs, Useful text filters (wc, sort, uniq, expand, head, tail, nl, tac), Spitting files across disks (split), Using redirection to connect programs to files Redirect into files with append (>>)

### **Regular expression searches**

- Searching files with regular expressions (grep),
- The concept of ‘pattern matching’ with regular expressions,
- Escaping special characters in regexps (\),
- Matching any character (.),
- Matching alternative patterns (|),
- Simple use of sed to ‘search and replace’

### **Documentation**

- The unfortunate diversity of Linux documentation
- Using man(1)
- How manpages are divided among ‘sections’
- Searching for man pages (apropos, man -k)
- Printing man pages (man -t)
- Documentation for shell builtins (help)
- Using GNU info documentation (info)
- Documentation under /usr/share/doc

### **Text editing with Vi**

- Unix is all about text
- Vi: the standard Unix editor
- The concept of ‘modes’ in a modal editor
- Vi clones, extensions to vi
- Other powerful Unix text editors
- Practical work learning Vi and Vim

### **Processes and jobs**

- What processes are
- The properties of a process
- Parent processes and child processes
- Job control (fg, bg, jobs)
- Suspending processes (Ctrl+Z)
- Running programs in the background (&)
- Long-lived processes (nohup)
- Monitoring processes (ps, pstree, top)
- Killing processes and sending signals a process (kill, killall, xkill)
- Process niceness/priority (nice, renice)

### **Filesystem concepts and use**

- The unified Unix filesystem
- Special file types
- Symbolic links (ln -s)
- Inodes and directory entries
- Hard links
- Preserving links while copying and archiving
- Where to put things: the FHS

### **Filesystem security**

- Users and groups
- The ‘root’ user, or superuser
- Changing file ownership (chown)
- Changing file group ownership (chgrp)

- More complex ways of changing ownership (recursively, changing owner and group simultaneously)
- Permissions on files
- Permissions on directories
- How permissions are applied
- Changing permissions (chmod)
- The special 'sticky bit' mode on directories
- Setgid and setuid permissions, their effect on files and directories
- Default permissions for new files (umask)

#### **Filesystem design and maintenance**

- Disks, partitions, individual filesystems and filesystem types
- Naming of disk and partition devices (/dev/hda, etc)
- Creating and deleting partitions (fdisk)
- Mounting and unmounting filesystems (mount, umount)
- Checking available free space and space used by files (df, du)
- Checking and correcting the integrity of filesystems (fsck)
- Journaling filesystems, converting from ext2 to ext3

#### **Booting and runlevels**

- The boot process: from BIOS to kernel to userspace
- Setting kernel parameters
- Configuring a boot loader: LILO and Grub
- Runlevels and init scripts
- Configuring services to run at boot
- Securing single-user mode (su login)
- Shutting down and rebooting the system

#### **Managing user accounts and configuration files**

- Configuration files
- Environment variables for configuration (PATH, PS1, DISPLAY, http\_proxy)
- Setting and examining shell aliases
- Configuring the readline library (inputrc files)
- User database files (/etc/passwd, /etc/group, etc)
- Changing passwords (passwd)
- Adding users (useradd, adduser)
- Deleting and modifying user accounts (userdel, usermod)
- Locking and unlocking user account

#### **14. Prescribed Text**

- Online Study notes from Redhat

#### **15. Recommended Text**

- Peterson J. L., Operating System Concepts, 2<sup>nd</sup> Edition, Addison-Wesley Publishing Company, Inc. Canada
- Peek Jerry, Learning UNIX Operating System, Fifth Edition et al;
- Ball Bill, Red Hat Linux 8 Unleashed (Paperback)
- Collings Terry (Red Author), Wall Kurt, Hat Linux Networking and System Administration (With CD-ROM) by

## YEAR 3 SEMESTER 1

### UNIVERSITY OF MALAWI – THE POLYTECHNIC

#### SYLLABUS

- 1 **Programme** : Bachelor of Science in Information Technology
- 2 **Course** : Telecommunications
- 3 **Year** : Three
- 4 **Code** : TEL-380
- 5 **Semester** : One
- 6 **Presented to** : Faculty of Applied Studies
- 7 **Presented by** : Department of Computing and Information Technology
- 8 **Lecture hours per week** : 2
- 9 **Tutorial hours per week** : 1
- 10 **Method of Assessment** : 60% examinations and 40% course work
11. **Aims of the Study:**

To introduce the students to the properties of various transmission media available to digital network systems
12. **Objectives:**

By the end of the course students should be able to

  - a) understand the major properties of various transmission media
  - b) make informed choice of an appropriate transmission media for practical application
13. **Topics of study**
  - Voice Characteristics Voice Processing
  - Carriers
  - Analog Vs. Digital Transmission
  - The Telephone Network Computer To Telephony Integration
  - Data Communications
  - Line Vs. Trunks
  - T1 And T-Carrier System
  - The Open Systems Interconnect Model
  - Packet Switching Technologies
  - Baseband Vs. Broadband
  - Fiber Distributed Data Interface
  - Frame Relay, ISDN, ATM
14. **Recommended books**
  - Halsall Fred (Hardcover) Data Communications, Computer Networks, and Open Systems
  - Kurose James F, Ross Keith W (Hardcover) Computer Networking: A Top-Down Approach Featuring the Internet
  - McGraw –Hill, (October 25 2001), Telecom Crash Course by Steven Shepard Publisher: - Professional; 1st edition,)
  - September 1, 2002, 1st edition , Handbook of Telecommunications Economics by Martin Cave Publisher: North-Holland

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## UNIVERSITY OF MALAWI – THE POLYTECHNIC

### SYLLABUS

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : PHP & Dynamic Web Pages  
3 **Year** : Three  
4 **Code** : WEB-300  
5 **Semester** : One  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information Technology  
8 **Lecture hours per week** : 2  
9 **Practical hours per week** : 2  
10 **Method of Assessment** : 50% examinations and 50% course work  
11 **Aim of Study**  
The aim of this course is to introduce web developing skills in build dynamic e-commerce web sites using the PHP programming language

#### 12. Objectives:

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

- build dynamic web
- build web-enabled databases
- build form-processing and mail interface
- understand form-authentication techniques
- acquire the basic working knowledge of HTML and HTTP.

#### 13. Topics of Study:

##### i. Introduction to PHP

- History of PHP
- Comparison with dynamic content alternatives (Perl, CGI, ASP, JSP, Servlets , CGI, etc)
- PHP tools and set up (web browser/server, editor, libraries, etc)
- Create a basic PHP Script
- Use PHP to generate HTTP headers
- Pass PHP variables via the URL

##### ii. Taking User Input from Forms via PHP

- Creating forms with PHP
- Using the form GET method
- Using the form POST method
- Obtaining data from forms through variables
- Using hidden fields

- pages calling themselves using forms
- Quoting HTML entities in user input

##### iii. Variables and Expressions in PHP

- Identifiers
- Data Types (integers, floats and strings)
- Creating Variables
- Variable assignment
- Variable Scope
- User-defined Constants
- HTTP environment variables

##### iv. PHP Operators

- Arithmetic Operators
- Logical Operators
- Relational Operators
- Bitwise Operators
- Other Operators
- Assignment Operators

**v. Conditional Tests and Events in PHP**

- True and False
- If , else and elseif
- The switch / case statement
- The ? Operator
- Comparing for equality or identity

**vi. PHP Flow Control**

- Loops
- while ,do .. while
- for
- break and continue
- exit

**vii. PHP Functions**

- Purpose of functions
- Built-in functions
- Declaring functions
- Arguments to functions
- return
- Scope (global vs local)
- Recursion
- Variable function calls

**viii. Storing Data in Arrays using PHP**

- What are arrays?
- How and when to use arrays
- Indexing arrays
- Initializing arrays
- Add/remove info from arrays
- One-dimensional arrays
- Multi-dimensional arrays
- *Array-related functions*

**ix. Handling Databases with PHP**

- PHP's database APIs
- Error-handling strategies
- Connection/disconnection, log in/log out
- Including common access functions
- Doing simple SQL queries via PHP
- Building HTML tables using SQL Queries

**x. Using Cookies with PHP**

- Cookie properties
- Setting a cookie in PHP
- Retrieving PHP cookies
- Expiring/Deleting PHP cookies
- Drawbacks to cookies
- Using cookies well

- Cookie Security Issues

**xi. Session Management in PHP**

- What is a session?
- Dependencies on the php.ini file
- Understanding PHP session variables
- Create a PHP session variable
- Register and modify PHP session variables
- Putting PHP session IDs in pages
- Good Practice with sessions and PHP
- PHP Sessions and databases

**xii. File and Directory Access Using PHP**

- Opening files, local and remote
- Reading and writing files
- include , require
- Handling file permissions
- Handling file ownership
- File locking
- Opening and reading directories
- File uploads from the browser/user

**xiii. Other I/O Issues in PHP**

- Getting IP addresses from visitors
- Getting referring urls from visitors
- Shell Commands
- Environment variables
- Showing different content to different browsers (IE, Netscape, Mozilla, Opera, etc)
- Debugging
- Handling HTTP and MIME headers

**xiv. Handling Email with PHP**

- Sending email
- Unix and NT setup
- Attachments with PHP

**xv. Objects in PHP**

- Object basics
- Inheritance
- Classes in PHP
- Constructor functions
- Accessing instance data and functions

**xvi. Graphics in PHP**

- Graphics basics
- Image MIME type

- Basic examples
- Creation from an existing image
- Image copying and resizing
- Drawing text on images
- *True Type fonts*

**14. Prescribed Text**

- Create Dynamic Web Pages Using PHP and MySQL by David Tansley

**15. Recommended Text**

- Welling Luke, Thomson Laura, PHP and MySQL Web Development
- Greenspan Jay (Author), Bulger Brad (Author), *MySQL/PHP Database Applications*
- Thomas Deepak, *Professional PHP4 Programming*, et al
- Reese George, *Managing and Using MySQL (2nd Edition)*, et al
- Lea Chris *Beginning PHP4*, et al

UNIVERSITY OF MALAWI – THE POLYTECHNIC

SYLLABUS

- 1 **Programme** : Bachelor of Science in Information Technology
- 2 **Course** : Mastering Sequential Query Language (SQL)
- 3 **Year** : Three
- 4 **Code** : CIT-301
- 5 **Semester** : One
- 6 **Presented to** : Faculty of Applied Studies
- 7 **Presented by** : Department of Computing and Information Technology
- 8 **Lecture hours per week** : 2
- 9 **Practical hours per week** : 2
- 10 **Method of Assessment** : 60% examinations and 40% course work

11 **Aim of Study**

The aim of this module is to introduce the ANSI standard SQL database query language and a good grounding in SQL database design and use.

12. **Objectives:**

At the end of the course the students should be able to:

- write generic SQL statements for use in application programming.
- understanding the operation of a MySQL database engine

13. **Topics of Study:**

**A. Lectures**

What is SQL?

- A simple SQL statement
- SQL-92
- Differences between SQL dialects
- Choosing a database
- Relational databases
- Relational vs. flat file databases
- Standardization
- Normalization
- First, second, and third normal forms

**SQL Foundations**

- Database components
- Creating a table
- Table statements
- Understanding indexes
- Creating indexes
- Indexes and engines
- The INSERT statement
- The SELECT statement

**The SELECT statement**

- Filtering SELECTs
- WHERE in more detail

- LIKE
- INTO
- Sorting information
- ORDER BY
- Ordering multiple columns
- Ascending and descending order

**Joins**

- What are joins?
- Why you need joins
- Creating a simple join
- INNER joins
- OUTER joins
- LEFT joins
- RIGHT joins
- FULL joins
- UNION

**Key SQL Functions**

- Strings and substrings
- UPPER and LOWER
- LENGTH
- TRIM
- Arithmetic functions
- SUM
- AVG

- MIN and MAX
- Date functions
- DATEADD
- DATEDIFF
- DATEPART
- GETDATE
- SYSDATE
- TODAY

### Views

- What they are and how they work
- Abstraction
- Selecting from a view
- Creating a view
- Updates with views
- Secure views

## B. Practicals

### Querying a table

- Creating the table
- Data types
- INSERTs
- SELECTs
- Adding rows
- The UPDATE statement
- The problem with UPDATEs
- Using the WHERE clause with UPDATE
- The DELETE statement
- The ALTER statement

### Mastering the SELECT statement

- The GROUP BY clause
- Sorting or GROUP BY?
- Sub-SELECTs
- Sub-SELECT options

- EQUALS
  - *DISTINCT*

### The MySQL RDBMS

- Compilation of source code
- Installation
- Configuration
- MySQL extensions
- Optimizing SELECTs, UPDATEs, INSERTs and DELETEs
- Table types
- Portability
- Tuning mysqld
- OS tuning
- Hardware tuning
- Drivers and interfaces for PHP and C++

## 14 Prescribed Text

- Mastering SQL by Martin Gruber Publisher: Sybex; Book and CD-ROM edition (January 12, 2000)

## 15. Recommended Text

- Van Der Lans Rick F, Publisher, (November 1999), Introduction to SQL: Mastering the Relational Database Language (3rd Edition), Book and CD-ROM edition 2002.: Addison-Wesley Pub Co;
- Gilfillan Ian, (Paperback December - Mastering MySQL 4 ) Publisher: Sybex;
- Young Mike (Author), Young Curtis W, Mastering SQL Server 2000 Security (Gearhead Press--In the Trenches) .

**YEAR 3 SEMESTER 1**

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Internet & TCP/IP  
3 **Year** : Three  
4 **Code** : NET-301  
5 **Semester** : One  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information Technology  
8 **Lecture hours per week** : 2  
9 **Practical hours per week** : 2  
10 **Method of Assessment** : 60% examinations and 40% course work

**11 Aim of Study**

This TCP/IP course aims at providing theoretical and practical grounding in the operation of core TCP/IP and internet protocols

**12. Objectives:**

At the end of the course students should be able to

- a) understand the role of TCP/IP and data transmission
- b) understand IP routing and packet structure
- c) understand Present-day issues in IP networking such as Network Address Translation (NAT)
- d) setup e-mail and web interfaces
- e) use the Internet for e-commerce and e-business

**13. Topics of Study:**

**A. Lectures**

**Background to TCP/IP and the Internet**

- Overview of how the Internet is supposed to work
- Foundations: Packet Switching
- History and culture
- Internet administration
- Requests for Comments (RFCs)
- TCP/IP: open standards-based application services
- How RFCs and other standards affect TCP/IP
- Protocol layering: Physical layer independence, OSI and TCP/IP
- Components of TCP/IP networks
- The TCP/IP misnomer: it's just IP

**Web browsing explained**

- An analogy
- Initial communication
- Lost in the post
- Order arrival
- Order failure
- Webpage failure
- Further requests

**Locating Resources by Name and Address**

- IP addresses are numeric
- Locating resources by name
- Numeric addresses
- Name Resolution
- DNS, the Domain Name Service
-

### **Conversations and reliability**

- TCP — a reliable pipe
- TCP connections
- Multiple conversations
- Port numbers
- Multiple connections from many hosts
- Multiple connections from one host

### **Conversations and packets: TCP**

- Conversations?
- Streams and packets
- What IP does
- What TCP does
- Protocol layering
- Link layer
- Internet layer
- Transport layer
- Application layer
- The OSI reference model
- OSI and TCP/IP
- Problems with providing reliability
- Sequence numbers
- Positive acknowledgment
- Sending acknowledgments
- Three-way handshake
- Choosing sequence numbers
- Naïve acknowledgments
- Sliding windows
- Maximum segment size

### **IP addressing and routing**

- Binary numbers: a reminder
- Limits of binary numbers
- Masking with binary numbers
- IP addresses
- Network part and host part
- Network part
- Network masks
- Variable-length subnet table
- Network addresses and broadcast addresses
- Address classes
- The rise of classless addressing
- Classful addressing in the modern world
- Private network allocations
- Loopback addresses
- IP routing concepts
- Routing decisions

- Routing example: single host with dial-up
- Routing example: host on directly-connected network
- Routing example: gateway host
- Routing tables
- Scalability of routers
- Summary of unavailable IP addresses

### **Fragmentation in IP**

- Frame and datagram sizes
- Fragmentation
- Where reassembly happens
- The reassembly process
- Datagram size tradeoffs
- Path MTU Discovery

### **IP packet structure**

- Packet structure concepts
- IP datagrams
- IP options
- Applicability of IP options
- UDP packets
- TCP segments

### **IP control messages**

- The need for control messages
- The rôle of ICMP
- Who sees ICMP error messages?
- ICMP message format
- Summary of ICMP message types
- ICMP Echo Request
- ICMP Echo Reply
- ICMP Destination Unreachable
- Destination Unreachable codes
- Destination Unreachable codes
- ICMP Source Quench
- ICMP Time Exceeded
- ICMP Parameter Problem
- Further reading

### **DNS**

- Before DNS
- Domain names
- Authoritative hosts
- Delegating authority
- Resource records
- SOA records
- A and CNAME records
- PTR and NS records
- MX records
- Querying name servers

- Scalability
- DNS protocol

#### **Present-day issues in IP networking**

- A history lesson
- The modern world
- The origins of address shortage
- CIDR's effects on address shortage
- Responses to address shortage
- Proxy servers
- Centralised email delivery
- Proxy web servers
- Web proxy details
- Network Address Translation
- NAT routers
- NAT on outgoing datagrams
- NAT on incoming datagrams
- NAT is directional
- NAT in datagram payloads

- IPv6: the next-generation Internet
- Network security
- Packet-filtering firewalls
- Firewall policies
- Firewall rules
- Common problems with packet filtering
- Limitations of packet filtering
- 

#### **SNMP: an IP management protocol**

- Network management protocols
- SNMP: the Simple Network Management Protocol
- Agents and managers
- SNMP organisation
- Object Identifiers
- An example OID
- Problems with SNMP

### **B. Practicals**

#### **HTTP**

- HTTP communications
- HTTP requests
- Request lines
- HTTP request headers
- HTTP responses
- Status lines
- Status codes
- Error status codes
- HTTP response headers
- Optional HTTP response headers
- HTTP specification
- HTTP details
- Practising HTTP

#### **Email**

- Sending and receiving email
- Email addressing
- Message structure
- MIME — Multipurpose Internet

- Mail Extensions
- Sending a message
- SMTP — Simple Mail Transfer Protocol
- Example SMTP session
- Extended SMTP
- Mail exchangers
- Delivering a message
- Mail boxes
- POP — Post Office Protocol
- POP protocol overview
- Example POP session
- Example POP session
- IMAP — Internet Message Access Protocol
- Example IMAP session
- Example IMAP session

### **14. Recommended Text**

- Stevens W. Richard, The Protocols (TCP/IP Illustrated, Volume 1) (Hardcover - January 1994)
- Comer E Douglas, Stevens David L, (Preface) (Hardcover) Internetworking with TCP/IP Vol. II: ANSI C Version: Design, Implementation, and Internals (3rd Edition)

- Stevens Richard W. TCP for Transactions, HTTP, NNTP, and the UNIX(R) Domain Protocols (TCP/IP Illustrated, Volume 3) (Hardcover)
- Jones Tim M, (Paperback - June 2002) TCP/IP Application Layer Protocols for Embedded Systems (With CD-ROM) `

UNIVERSITY OF MALAWI – THE POLYTECHNIC

SYLLABUS

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Hardware Engineering (Building a Computer Hardware System)  
3 **Year** : Three  
4 **Code** : CIT-302  
5 **Semester** : One  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information Technology  
8 **Lecture hours per week** : 1  
9 **Practical hours per week** : 3  
10 **Method of Assessment** : 30% examinations and 70% course work

11 **Aim of Study**

The aim of this course is act as a practical guide to all parts for a PC and putting them together.

12. **Objectives:**

At the end of the course students will be able to

- (a) Identify all pieces of hardware PC
- (b) Assemble and customize a PC from start to finish
- (c) install the Operating System and other software
- (d) upgrade and add components to a PC

13. **Topics of Study:**

A. **Lectures**

- Building a PC System
- Standard Components Of A PC System
- Extra Options For Special Applications
- Case and Power Supply
- Power Connectors For Drives
- This and That: Screws, Spacers & Jumpers
- Motherboard Overview
- Onboard Components

B. **Practicals**

- Basic Motherboard Configuration
- Setting The Clock Speed
- Connecting The Floppy Drives
- Connecting Hard Drives and CD-ROM/DVD, SCSI Drives - The Exception
- Safety Notice: The destructive potential of electrostatic

14. **Recommended Text**

- Chambers Mark L., *Building a PC for Dummies (For Dummies)* (Paperback)
- Thompson Robert Bruce, Thompson Barbara Fritchman *PC Hardware in a Nutshell, 2nd Edition* (Paperback)
- Gralla Preston, *How to Expand & Upgrade PCs* (Paperback)
- Scott Mueller *Upgrading and Repairing PCs 6th Edition* (Paperback)
- Mueller Scott *Upgrading and Repairing PCs (14th Edition)* (Hardcover)

## YEAR 3 SEMESTER 2

### UNIVERSITY OF MALAWI – THE POLYTECHNIC

#### SYLLABUS

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Hardware Engineering (Diagnostics)  
3 **Year** : Three  
4 **Code** : CIT-302  
5 **Semester** : Two  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information Technology  
8 **Lecture hours per week** : 1  
9 **Practical hours per week** : 3  
10 **Method of Assessment** : 30% examinations and 70% course work  
11 **Aim of Study**  
The aim of this course is to introduce students to techniques and methods used in repairing PCs.

#### 12. Objectives:

At the end of the course students should be able to

- Diagnose and repair PC problems
- Improve software performance and user productivity
- Select the best equipment for diagnostics
- Recover data from crashed, corrupted, erased or reformatted disks
- Optimize PC performance
- Know when to upgrade or replace PC systems

#### 13. Topics of Study:

##### A. Lectures

##### **Introduction**

- Troubleshooting tools Anti-static precautions
- Power supply formats
- Buying replacement power supplies
- *Install workstation power supply*
- Motherboard formats, Upgrading to a new motherboard
- The CPU, Pentium, PII, PIII, Pentium Pro, 6x86, K6, K7, MMX, Intel, AMD, Cyrix
- Resolving disk type problems
- Numeric error codes
- Decoding audible beep codes
- Internal system codes
- Run diagnostics on workstations
- Learn how to diagnose a dead system
- Board settings
- IRQ / DMA / I/O Port
- ROM /RAM addresses
- Determining the correct board settings
- How to decipher manual pages
- System configuration programs

##### **PC Diagnostics**

- Diagnostic hardware and software
- Checkit, AMIdiag, QA Plus
- IRQ / DMA / POST cards
- Memory chips and modules

## B. Practicals

- Partition Magic, Norton Utilities
- ScanDisk and Defrag
- Using Partition Magic to change disk layout
- Use ScanDisk and Defrag to fix disk problems
- Configure the workstation CMOS and Upgrading the BIOS
- Replacement ROM chips
- Applying Flash ROM upgrades
- Advanced CMOS Settings
- Software settable cards
- Installing expansion cards
- Install a variety of expansion cards
- Installing Expansion Cards
- Troubleshoot with diagnostic hardware
- Using the PC's built-in diagnostics

### 14. *Recommended Text*

- Hennessy John and Kaufmann Morgan David Patterson, 1997, Computer organization and Design - The Hardware/Software Interface,
- Hall Prentice Tanenbaum Andrew, 1999, Structured Computer Organization,
- Hall Prentice Stallings William, ,
- Structured Computer Organization Andrew Tanenbaum Prentice Hall, 2000
- Lecture Slides for 06-08752 Georgios Theodoropoulos

## UNIVERSITY OF MALAWI – THE POLYTECHNIC

### SYLLABUS

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Advanced PHP Programming  
3 **Year** : Three  
4 **Code** : PRG-303  
5 **Semester** : Two  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information Technology  
8 **Lecture hours per week** : 1  
9 **Practical hours per week** : 3  
10 **Method of Assessment** : 50% examinations and 50% course work  
11 **Aim of Study**  
The aim of this course is to give the students the necessary tools for server side scripting using PHP

#### 12. Objectives:

At the end of the course students should be able to

- use PHP as an advanced server side scripting language with Objects and Classes
- set and read cookies and manage sessions
- interface mail servers and generate graphics on-the-fly

#### 13. Topics of Study:

##### A. Lectures

##### Handling Databases with PHP

- PHP's database APIs
- Error-handling strategies
- Connection/disconnection, log in/log out
- Including common access functions

##### Using Cookies with PHP

- Cookie properties
- Drawbacks to cookies
- Using cookies well
- Cookie Security Issues

##### Session Management in PHP

- What is a session?
- Dependencies on the php.ini file
- Understanding PHP session variables
- Good Practice with sessions and PHP
- PHP Sessions and databases

##### Other I/O Issues in PHP

- Getting IP addresses from visitors
- Getting referring urls from visitors
- Environment variables
- Debugging
- Handling HTTP and MIME headers

##### Handling Email with PHP

- Sending email
- Unix and NT setup
- Attachments with PHP

##### Objects in PHP

- Object basics
- Inheritance
- Classes in PHP
- Constructor functions
- Accessing instance data and functions

## Graphics in PHP

- Graphics basics

### **B. Practicals**

- Doing simple SQL queries via PHP
  - Building HTML tables using SQL Queries
  - Setting a cookie in PHP
  - Retrieving PHP cookies
  - Expiring/Deleting PHP cookies
  - Create a PHP session variable
  - Register and modify PHP session variables
  - Putting PHP session IDs in pages
- File and Directory Access Using PHP**
- Opening files, local and remote
  - Reading and writing files
  - include
- Image MIME type
  - Basic examples
  - require
  - Handling file permissions
  - Handling file ownership
  - File locking
  - Opening and reading directories
  - File uploads from the browser/user
  - Shell Commands
  - Creation from an existing image
  - Image copying and resizing
  - Drawing text on images
  - True Type fonts
  - Showing different content to different browsers (IE, Netscape, Mozilla, Opera, etc)

## 14. Recommended Text

- Schlossnagle George, Advanced PHP Programming (Paperback)
- Cosentino Christopher, Advanced PHP for Web Professionals Paperback
- Webster Steve Advanced PHP for Flash et al; Paperback
- Ullman Larry E Ullman Larry, PHP Advanced for the World Wide Web Visual QuickPro Guide
- Glasshaus Author Team Dreamweaver MX: Advanced PHP Web Development \ Paperback

## YEAR 3 SEMESTER 2

### UNIVERSITY OF MALAWI – THE POLYTECHNIC

#### SYLLABUS

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Windows-Unix interface using Samba  
3 **Year** : Three  
4 **Code** : UNX-301  
5 **Semester** : Two  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information Technology  
8 **Lecture hours per week** : 1  
9 **Practical hours per week** : 3  
10 **Method of Assessment** : 50% examinations and 50% course work

11 **Aim of Study**

The aim of the study is to enabling students to install and configure Samba to provide basic Microsoft Windows style network services, e.g. file serving, print serving, domain control, PAM authentication, distributed file system, etc.

12. **Objectives:**

As Samba is widely used to provide MS Windows network services to desktop computers from business class UNIX/Linux servers, at the end of the course students should be able to

- i. understand the installation procedures of Samba on Unix Systems,
- ii. configure Samba installation for secure Windows interface
- iii. understand the use of Samba

13. **Topics of Study:**

A. **Lectures**, Windows and Linux Operating systems should have been covered already by this time

B. **Practicals**

**Installing and Testing SAMBA**

- Using the Samba man pages
- Building the Binaries
- Create the smb configuration file.
- Test your config file with testparm
- Starting the smbd and nmbd
- Listing the shares available on your server
- Connecting with the unix client
- Connecting from a Win9x/NT/2k/XP client
- Troubleshooting
  - Diagnosing problems
  - Scope IDs

- Choosing the protocol level
- Printing from UNIX to a client PC
- Locking
- Mapping usernames
- Other character sets

**Integrating MS Windows networks with Samba**

- Name Resolution in a Unix/Linux environment
  - /etc/hosts
  - /etc/resolv.conf
  - /etc/host.conf
  - /etc/nsswitch.conf

- Name resolution in MS Windows networking
  - The NetBIOS name cache
  - The LMHOSTS file
  - HOSTS file
  - DNS lookup
  - WINS lookup
- Browsing functions: achieving stable and dependable browsing using Samba
- MS Windows security options: configuring Samba for seamless integration
- Use MS Windows NT as an authentication server
- Make Samba a member of an MS Windows NT security domain
- Configuring Samba as an authentication server
  - Users
  - MS Windows NT Machine Accounts
- Viewing file security on a Samba share
- Viewing file ownership
- Viewing file/directory permissions
- Modifying file/directory permissions
- Interaction with the standard Samba create mask parameters

Interaction with the standard Samba file attribute mapping

### **Printing Support in Samba**

- **Configuration**
- Creating [print\$]
- Setting drivers for existing printers
- Support a large number of printers
- Adding new printers via the Windows NT APW
- Samba and printer ports
- **The Imprints toolset**
- What is Imprints?
- Creating printer driver packages
- The Imprints server
- The installation client
- Migration to from one Samba version to another

### **Configuring PAM for distributed but centrally managed authentication**

- Samba and PAM
- Distributed authentication
- PAM Configuration in smb.conf

### **Hosting a Microsoft Distributed File System tree on Samba**

- Instructions
- Configuring Samba with the --with-msdfs option
- Setting the msdfs parameter in smb.conf
- Designating a share as a Dfs root using the share level msdfs root parameter
- Setting up a Dfs tree on a Samba server smb.conf
- Setting up dfs links to other networked servers via the /export/dfsroot directory
- Browsing the Dfs tree on the Samba server at \\samba\dfs

### **UNIX Permission Bits and Windows NT Access Control Lists**

- Viewing and changing UNIX permissions using the NT security dialogs

### **Joining MS Windows domains in Samba**

- Joining an NT Domain with Samba 2
- Samba and Windows 2000 Domains
- Why is domain based security based than server based security?

### **Configuring Samba 2 as a Primary Domain Controller**

- Configuring the Samba Domain Controller
- Creating machine trust accounts and joining clients to the domain
- Manually creating machine trust accounts
- Creating machine trust accounts "on the fly"
- Common problems and errors
- System policies and profiles
- Domain control for Windows 9x/ME/XP

- Network logons
- Setting up roaming user profiles
- - Windows NT configuration
  - Windows 9X configuration
  - Win9X and WinNT configuration
  - Windows 9X profile setup
  - Windows NT Workstation 0
    - Windows NT Server
    - Sharing profiles between W95 and NT Workstation
- DOMAIN\_CONTROL.txt :  
Windows NT domain control & Samba

**Accessing Samba source code via CVS**

- CVS Access to samba.org
- Access via CVSweb
- Access via cvs

**14. Prescribed Texts**

- Linux Samba Server Administration (Craig Hunt Linux Library) by Roderick W. Smith Publisher: Sybex; 1st edition (November 13, 2000)
- Using Samba (O'Reilly System Administration) by Robert Eckstein, et al (Paperback - November 1999)
- Linux and Windows 2000 Integration Toolkit: (A Complete Resource with CDROM) by Ross Brunson (Author)

**YEAR 3 SEMESTER 2**

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

1	<b>Programme</b>	: Bachelor of Science in Information Technology
2	<b>Course</b>	: Website Design & Development
3	<b>Year</b>	: Three
4	<b>Code</b>	: WEB-305
5	<b>Semester</b>	: Two
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing and Information Technology
8	<b>Lecture hours per week</b>	: 2
9	<b>Practical hours per week</b>	: 2
10	<b>Method of Assessment</b>	: 30% examinations and 70% course work
11	<b>Aim of Study</b>	

The aims of this study are to

1. introduce the basic elements of the HyperText Markup Language (HTML) and its XML-compatible variant, XHTML, i.e., the standards which determine the structure and use of web pages.
2. teach best practice in vendor-neutral, standards-compliant, cross-platform, and completely *transferable skills*.

12. *Objective:*

On completion of this course, students should be able to

- (a) produce standard-compliant web pages that work with any of the well-known browser such as Internet Explorer and Netscape
- (b) use webpage editors such as Dreamweaver, MS FrontPage, GoLive, IIS, ColdFusion, etc

13. *Topics of Study:*

A. **Lectures**

### Overview of HTML

- Brief history of HTML
- How the web works — clients and servers
- Browsers and rendering

### The Basics of HTML

- Hierarchical structure: elements (tags) and text
- Basic document structure
- Paragraphs
- Whitespace and line breaks
- Headings
- Phrase mark-up
- Hypertext links
- Embedded images
- Lists
- Preformatted text
- Special characters
- Semantic markup

### Simple design customization with CSS

- Relationship between HTML and CSS
- Linking to a style sheet in a separate file
- Examples of common customizations

### Images

- Bitmapped images
- Types of image: GIF, JPEG, PNG
- Image type tradeoffs
- Creating images

### Tables

- Using tables for tabular data
- Abusing tables for layout
- Basic table structure
- Cells that span rows or columns
- Cell alignment
- Styling table cells

### B. Practicals

*Design web pages that include all the elements of Web design discussed above.*

- Server-side scripting: forms
- Form elements
- Client-side scripting
- JavaScript
- Graphics

### More CSS

- The box formatting model
- Borders
- Margins and padding
- Collapsing margins
- Formatting edges differently
- Background colours and background images
- Selectors
- Multiple selections
- Classes
- <div> and <span>
- Descendant selectors
- Text appearance
- Typefaces
- Font sizes
- Other font properties
- Leading
- Text alignment and justification

### XHTML

- What is XML?
- Relationship between HTML and XHTML
- Why use XHTML?
- Changes in the document prologue
- Changes in element tags
- Handling empty elements

### HTML and Scripting

- Server-side scripting: forms
- Form elements
- Client-side scripting
- JavaScript
- Graceful degradation
- Examples

### Embedding Multimedia

- Image maps
- Embedding flash movies
- Graceful degradation

- Multimedia
- Tables
- Style sheets, CSS
- Frames

### 14. *Recommended Text*

- Castro Elizabeth, ( September 17, 2000) HTML for the World Wide Web with XHTML and CSS: Visual QuickStart Guide, Fifth Edition Publisher Peachpit
- Niederst Jennifer, October 15, 2001 *PressWeb Design in a Nutshell*, 2nd edition Publisher: O'Reilly & Associates

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

1	<b>Programme</b>	: Bachelor of Science in Information Technology
2	<b>Course</b>	: Microelectronics Systems II
3	<b>Year</b>	: Three
4	<b>Code</b>	: ELE-382
5	<b>Semester</b>	: Two
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing and Information Technology
8	<b>Lecture hours per week</b>	: 2
9	<b>Practical hours per week</b>	: 2
10	<b>Method of Assessment</b>	: 60% examinations and 40% coursework

**11 Aim of Study**

*To develop further skills and knowledge requires to understand microelectronic systems.*

**12. Objectives of study**

*By the end of this course students must be able to:-*

- a) develop a knowledge of a microprocessor-based system, its component parts and their interrelated functions;*
- b) develop an understanding of how a machine code program controls the operation of the overall system;*
- c) identify and appreciate the function and constraints of IC's used in micro-based systems;*
- d) Use an appropriate methodology to write and test assembly language programme;*
- e) Use assembly language programs to effect serial and parallel interfaces;*
- f) Appreciate the design constraints which lead to the need for, in particular, buffering, decoupling, noise immunity.*

**13 Topics of study**

***Interrupts***

- Deduce why interrupts are necessary especially in the handling of data transfer between peripheral and computer*
- Explain that an interrupt may cause the main program to call an interrupt service routine (ISR)*
- Infer that in returning from the ISR, the main program should continue as though it had never been interrupted*
- Explain the use of the stack in saving and resorting MPU registers when servicing an interrupt*
- Explain the mechanism of microprocessor response upon receipt of an interrupt*
- Distinguish between miscible and non-miscible interrupts.*

***Classification and packaging of VLSI elements***

- Discuss the implications of using TL, MOS, ECL in the power/speed trade off*
- Identify, using manufacturer's literature, the characteristics of a single chip computing element e.g. 8-bit and 16-bit processor and bit slice elements*

- Discuss, using manufacturer's literature, the function, operation and distinguish characteristics of: static RAM, dynamic RAM, MOS ROM, EPROM, EEPROM, parallel output port, parallel input port, bi-directional I/O port, parallel to serial output port, a counter/timer chip
- Investigate practically the performance of these devices with reference to manufacturer's data sheets and the system design

**B. Practicals**

**Assembly Language Programs**

- Write programs involving assignment, selection and interaction
- Assemble, debug and execute the programs written in above
- Write, assemble, test and debug an assembly language program to: parallel ports, serial ports involving the use of subroutines and interrupts.

**14. Recommended Text**

- Hughes, ( March 1995), Electrical Technology (7<sup>th</sup> Edition) Publisher: Longman Science & Technology; Revised edition
- Wolf Wayne, (Hardcover), ( January 14 2002,) ( Modern VLSI Design: System-on-Chip Design (3rd Edition) by **Publisher: Prentice Hall PTR**
- Sedra Adel S, Smith Kenneth C, ( January 1998), Microelectronic Circuits (Oxford Series in Electrical Engineering) Hardcover
- Lalond David, The 8080 8085 AND 280

## YEAR 3 SEMESTER 2

### UNIVERSITY OF MALAWI – THE POLYTECHNIC

#### SYLLABUS

- 1 **Programme** : Bachelor of Science in Information Technology
- 2 **Course** : Web Server Administration
- 3 **Year** : Three
- 4 **Code** : WEB-302
- 5 **Semester** : Two
- 6 **Presented to** : Faculty of Applied Studies
- 7 **Presented by** : Department of Computing and Information Technology
- 8 **Lecture hours per week** : 2
- 9 **Practical hours per week** : 2
- 10 **Method of Assessment** : 30% examinations and 70% course work

**11 Aim of Study**

The aim of this study is to provide a technical introduction to installing, configuring and management of a web server and the supporting CGI programming (Apache server).

**12. Objectives:**

At the end of the course students should be able to

- Configure an Apache Web Server
- Configure virtual hosts
- Run dynamic pages with CGI and PHP
- Configure HTTPS with mod\_ssl
- Use mod\_perl to create dynamic webpages with Perl

**13. Topics of Study:**

**A. Lectures**

**Introduction**

- Apache
- Web-servers
- Apache features

**Basic configuration**

- Configuring Apache
- Directives
- Modules
- Checking configurations
- Logging
- A little HTTP

- Server and directory index pages
- Custom index pages
- Forbidding index pages
- Trailing slashes in directory paths
- Directory paths without trailing slashes
- Per-directory configuration
- <Location> example
- Other directives affecting where settings apply
- Context for container directives

- Per-directory configuration outside *httpd.conf*
- *.htaccess* file configuration
- Protecting files with passwords
- Restricting access by IP address
- Address and password authentication

### **Serving multiple sites with virtual hosts**

- Multiple sites on a server
- Setting up virtual host names
- Testing host names
- Enabling virtual hosts
- Defining virtual hosts
- Configuring virtual hosts
- Using virtual hosts
- Host aliases
- Managing many hosts

### **Dynamic pages with CGI and PHP**

- Dynamic pages
- CGI
- CGI programs
- Sample Unix shell CGI script
- Sample Perl CGI script
- Running CGI programs with Apache
- CGI parameters
- Perl CGI parameter example

### **B. Practicals**

- Installing Apache on Unix
- Installing Apache on Windows
- Compiling Apache
- Running Apache
- Running Apache automatically
- Checking Apache is running
- Serving webpages
- Setting the document root
- Applying configuration changes
- Configuring log-file contents
- Specifying log-files
- Logging errors
- Browser error messages
- Custom error pages
- Creating a password file

- CGI issues
- PHP scripts
- Using *mod\_php*
- Sample PHP scripts

### **Using *mod\_perl* to create dynamic webpages with Perl**

- *mod\_perl*
- Using *mod\_perl*
- Using Apache::Registry
- Apache::Registry v CGI Perl
- Apache::PerlRun
- Other *mod\_perl* features

### **Using other modules**

- Modules
- Loading modules
- *mod\_speling*
- *mod\_rewrite*
- URL rewriting patterns
- Redirecting
- Transforming URLs
- Browser-dependent pages
- Deploying *mod\_rewrite*

### **Serving pages using HTTPS with *mod\_ssl***

- HTTP security
- HTTPS
- HTTP and HTTPS sites cohabiting
- HTTP and HTTPS virtual hosts

- Maintaining a password file
- Password authentication example
- Password authentication details
- Restricting access by IP address
- Listening only on specific IP addresses
- Installing *mod\_perl*
- Installing *mod\_ssl*
- Getting a certificate
- Configuring *mod\_ssl*

**14. Recommended Text**

- Aulds Charles, (Paperback), (September 16, 2002), Linux Apache Web Server Administration, Second Edition (Craig Hunt Linux Library), Publisher: Sybex;
- Hawkins Scott, (December 8, 2000), Apache Web Server Administration and e-Commerce Handbook (With CD-ROM) Publisher: Prentice Hall PTR; Book and CD-ROM edition

**YEAR 4 SEMESTER 1 & 2**

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology
- 2 **Course** : Java Programming
- 3 **Year** : Four
- 4 **Code** : PRG-480
- 5 **Semester** : One
- 6 **Presented to** : Faculty of Applied Studies
- 7 **Presented by** : Department of Computing and Information Technology
- 8 **Lecture hours per week** : 1
- 9 **Practical hours per week** : 2
- 10 **Method of Assessment** : 60% examinations and 40% course work
- 11 **Aim of Study**  
The aim of the study is to equip students with skills required to develop solid object-oriented applications written in Java, using sound coding techniques and best coding practices

- **Objectives of study**

- **At the end of the course students will**

- a) Understand not only the fundamentals of the Java language, but also it's importance, uses, strengths and weaknesses
- b) Understand the basics of the Java language and how it relates to OO programming and the Object Model
- c) Learn to use Java multi-threading and exception handling features
- d) Understand and use classes, inheritance and polymorphism
- e) Develop GUI applications using AWT and Swing
- f) Use Java for client-side applets, networking and communication applications
- g) Use the JDBC API for database access

- **Topics of Study**

## A. Lectures

### Review of Object Oriented Concepts

- Conventional vs Object Oriented Programming
- Inheritance, Abstraction and Polymorphism

### Getting Started with Java

- Writing a Simple Class
- Adding Methods to the Class
- Language Statements:
  - operators
  - comparison and logical expressions
  - for, while and do
  - switch
- Using Strings
- Specializing in a Subclass
  - - extending a class
    - overriding SuperClass methods
    - default constructor and implicit constructor chaining
- 

### Essential Java Programming

- Fields and Variables
- Using Arrays
- Static Methods and Fields
- Java Packages
- Using the JDK

### Advanced Java Programming

- Inheritance and Polymorphism
- Interfaces and Abstract Classes
- Exceptions
- Multithreading
- JavaBeans

### Java Developer's Toolbox

- Utility Classes
- Vector and Hashtable
- Collections
- Inner Classes
- Java I/O

## B. Practicals

### Graphical User Interfaces

- Containers and Layout Managers
- Writing Simple Graphical Applications
- Writing Complete Graphical Applications

### Java Application Development

- File System Access
- Networking
- Database Connectivity - JDBC
- Writing Java Applets

### Enterprise Java Overview

- Developing Java Servlets
- Introduction to Java Server Pages (JSPs)
- Java for the Enterprise

## 14. Recommended Text

- Cornell Gary, Horstmann, Cay S, (August 22, 2002), Core Java 2, Volume I: Fundamentals (6th Edition) **Publisher:** Prentice Hall PTR
- Burke Eric M, Coyner Brian M, (March 1, 2003) Java Extreme Programming Cookbook 1st edition, Publisher: O'Reilly & Associates
- Bloch Joshua, (June 5, 2001), Effective Java Programming Language Guide, 1st edition, Publisher: Addison Wesley Professional

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology
- 2 **Course** : Server Administration
- 3 **Year** : Four
- 4 **Code** : ADM-480
- 5 **Semester** : One
- 6 **Presented to** : Faculty of Applied Studies
- 7 **Presented by** : Department of Computing and Information Technology
- 8 **Lecture hours per week** : 1
- 9 **Practical hours per week** : 2
- 10 **Method of Assessment** : 60% examinations and 40% course work
- 11 **Aim of Study**  
*The Aim of the study is develop competence in Linux System Administration and provide a practical introduction to basic Unix and System Administration on a generic Unix platform, e.g. Sun's Solaris, IBM's AIX, HP-UX, SCO's Open Unix, FreeBSD, OpenBSD, NetBSD*
12. **Objectives of study**  
At the end of the course students will
  - a) achieve basic competence in using and managing a Linux systems
  - b) perform core Linux system administration tasks on a Linux server
13. **Topics of Study**
  - A. **Lectures**

**Configure fundamental system Identify and terminate runaway X hardware hardware applications**

- BIOS: datetime, disks, boot, devices
- BIOS: interrupts and dma addresses
- BIOS: device settings
- The 1024 cylinder limit
- top
- ps
- virtual terminals
- kill

**Setup SCSI and NIC Devices**

- NIC: Understand 3 era methodologies: jumper, non-volatile memory, self-configuring
- NIC: Verify configs with /proc/interrupts /proc/dma /proc/ioports
- SCSI: types
- SCSI: IDs, scsi logical unit numbers, linux device files
- SCSI: termination
- SCSI: controllers on PCs (scsi BIOS)

**Configure Modem, Sound cards**

- Modems: what they are
- Modems: types, ie. winmodems
- Modems: avoiding I/O and interrupt conflicts (sharing not necessary)
- Sound: correctly specify kernel module sound driver
- Sound: settings in /etc/modules.conf

**Design hard-disk lay-out**

- Issues and considerations
- Disk space
- Type of system / role
- Backup schemes and resources
- Swap space
- Filesystem functions

**Install a boot manager**

- Functions of LILO: find and load kernel into memory, start the kernel in memory
- How LILO works: bootloader in MBR started by BIOS, prompt-based kernel selection, map installer
- lilo command
- /etc/lilo.conf
- LILO locations

**Manage shared libraries**

- Understand function of linking:

**Install & Customize a Window Manager Environment**

- Understand startup procedure: startx -> xinit (via xinitrc) -> XFree86 -> client apps inc WM
- Know WM config files (not tested)
- Terminal emulators: /etc/lib/X11/app-defaults and .Xdefaults
- X libraries (gtk, ldd)
- Remote clients with local display: setup, host:display.screen syntax

**Fundamentals of TCP/IP**

- IP addresses and names
- Masks

**Protocols: TCP, IP, UDP, ICMP, Customize or write simple scripts**

- Concept of shell scripts (esp. vs DOS batch)
- She-bang (!) shell selector
- The script environment
- Paths and permissions (inc SUID and SGID)
- Return values
- File tests
- Command substitution
- Mail from scripts
- Key commands: break, case, continue, echo, exit, for, function, getopt, if, kill, read, return, shift, source, test, until, while
- Services and port numbers: ftp, telnet, snmp, dns, bootp/DHCP, http, pop3, nntp, netBIOS, imap, snmp
- Utilities: dig, ftp, ping, telnet, traceroute, whois Obj 2: (superseded)
- 

**Operate and perform basic configuration of apache**

- Know config files in /etc/httpd/conf or /usr/local/apache/conf , httpd.conf, srm.conf, access.conf, Basic directives, Start and stop

- static vs dynamic, shared libs
- Understand and use ldd
- Linking and finding libs via LD\_LIBRARY\_PATH
- Understand and use ldconfig for linking and finding
- system libs ind /etc/ld.so.cache /etc/ld.so.conf

#### Use Red Hat Package Manager (rpm)

- Overview
- Red Hat naming and numbering
- Running rpm
- Major operating modes of rpm
- Main options in each rpm mode
- rpm man page

#### Manage kernel modules at runtime

- Concepts: monolithic vs. modular
- Module files: /lib/modules/kernel-version
- lsmod
- insmod
- rmmod
- modinfo
- modprobe
- Configure and control modules (esp. interrupts and dma) via /etc/modules.conf
- modules.dep
- depmod

#### Reconfigure, build and install a custom kernel and modules

- Kernel versions: naming and numbering
- Required tools and files: C compiler (gcc), assembler, linker, make, kernel sources, kernel headers
- Kernel source tree, esp. .config and Makefile
- Creating a configuration: make config, make menuconfig, make xconfig, make\_oldconfig
- Compiling a kernel: make dep, make clean, make bzImage (etc), make modules, make modules\_install
- Installing a new kernel
- Configuring a new kernel with LILO

#### Properly manage the NFS, smb, and nmb daemons

- NFS concepts, /etc/exports, mount, smb.conf, Use samba as WINS client via nmbd, Run SWAT, No need to create custom samba configs
- Setup and configure basic DNS services
- Understand concept of resolver libraries, inc how they ID a host or domain, via /etc/hosts, via NIS, via DNS, Understand DNS config files: /etc/hosts, /etc/resolv.conf, /etc/host.conf (on older Linux), Use of named for local cacheing only (non-authorative answer), Get info about named from /var/log/messages, Basic use of nslookup and host, Know distinction between Bind v4 and Bind v8 (/etc/named.boot vs. /etc/named.conf)

#### Perform security admin tasks

Secure in-bound requests, Verify packages, Authenticate, Manage local security resources, TCP wrappers, tcpd, inetd, access control, logging, Finding, SUID files, Verifying packages with rpm -V etc, SGID effects on directories, Password management, chage, ssh

#### Setup host security

- Shadow passwords, Minimum inetd, syslog, Forwarding root mail to admins, CERT and bugtraq

#### Setup user level security

- ulimit (setting max use of resources and hence counteract DoS), etc.

#### Customize and use the shell environment

- Overview: What shells are and some history
- Bash
- Environment variables
- Shell variables (vs. environment)
- Aliases
- Functions
- Config files: /etc/profile, /etc/bashrc, ~/.bashrc,

~/.bash\_profile, ~/.bash\_login,  
~/.bash\_logout, ~/.inputrc

## B. Practicals

### Compiling and install programs from source code

- Find and get sources
- Understand tarballs
- configure command: functions and use
- make command: understand and use
- make install

### Install and configure local and remote printers

- Detailed knowledge of /etc/printcap
- Filters: APSfilter, magic filter, multiple filters
- Managing remote printers (inc samba) via /etc/printcap

### Perform basic file editing operations using vi

- Start vi, Edit, Inserts, Change and replace
- Delete, Copy and paste, Find

### Configure and use PPP

- Concepts: client-server, ports, modems
- Connection steps: serial connect -> account authenticate -> clientppp -> server binary datastream to initiate link, client uses temp IP address to send binary datastream and establish link
- pppd
- Connect manually
- Know about PAP, CHAP, MSCHAP authentication (setup not required)

### Install & Configure XFree86

- Select Xserver
- Install from source
- Install from binaries
- Configure via file XF86Config, knowing all sections of the file and via autoconfig tools

## TCP/IP Troubleshooting & Configuration

- Know network interfaces: eth0, ppp0, etc
- /etc/hostname
- /etc/hosts
- /etc/nsswitch.conf
- /etc/host.conf
- /etc/resolv.conf
- /etc/networks
- host command
- hostname, domain name and dns domain name commands
- ifconfig
- netstat
- ping
- route
- traceroute
- DHCP
- Manually configure DHCP
- Dynamic allocation
- Relay DHCP
- DHCP leases
- dhcpd

### Configure and manage inetd and related services

- Concept: superdaemon
- /etc/inetd.conf inc sections
- TCP wrappers
- Starting and stopping services

### Operate and perform basic configuration of sendmail

- Basic internet mail concepts (MTA, MUA, etc)
- Recognise /etc/sendmail.cf
- DSmial directive (to send to smart host)
- Redirect using aliases
- /etc/aliases
- Forwarding to another account
- .forward
- Queuing
- Mailq

### Setup XDM

- Config files /etc/X11/xdm

- Xfonts
- xset
- xfs
- Control X apps via .Xresources

#### **Manage printers and print queues**

- Lpd, lpr, lpq, lprm, lpc

#### **Print files**

- Using lpr

directory

- Xaccess
- Xresources
- Xserver
- Xsession
- Xsetup\_0
- xdm-config
- Running xdm automatically
- Basic customisation of xdm
- Use for managing x-terminals / x-stations

## **14 Recommended Text**

- Carstensen Jakob, (February 2001) Linux System Administration and Backup Tools for IBM Elogo Server Xseries and Netfinity, 1st edition **Publisher:** IBM Corp
- Aulds Charles, (November 2000), Linux Apache Web Server Administration, 1st edition **Publisher:** Sybex

## UNIVERSITY OF MALAWI – THE POLYTECHNIC

### SYLLABUS

- 1 **Programme** : Bachelor of Science in Information Technology
- 2 **Course** : Database Administration
- 3 **Year** : Four
- 4 **Code** : DBS-480
- 5 **Semester** : One
- 6 **Presented to** : Faculty of Applied Studies
- 7 **Presented by** : Department of Computing and Information Technology
- 8 **Lecture hours per week** : 1
- 9 **Practical hours per week** : 2
- 10 **Method of Assessment** : 60% examinations and 40% course work
- 11 **Aim of Study**  
*The Aim of the study is develop competence in MySql Relational Database administration.*

- **Objectives of study**

At the end of the course students will

- a) achieve basic competence in using and managing a MySQL Database systems
- b) perform core MySQL system administration tasks on a Linux server

- **Topics of Study**

**A. Lectures**

**Overview of DBA duties**

- Server startup/shutdown
- Mastering the mysqladmin administrative client
- Using the mysql interactive client
- User account maintenance
- Log file maintenance
- Database backup/copying
- Hardware tuning
- Multiple server setups
- Software updates and upgrades
- File system security
- Server security
- Repair and maintenance
- Crash recovery
- Preventive maintenance
- Understanding the mysqld server daemon
- Performance analysis (isamchk & myisamchk)

**The MySQL Data Directory**

- Deciding/finding the Data

**Recovering individual tables  
Tuning the MySQL Server**

- Default parameters
- The mysqladmin variables command
- Setting variables (command line and options file)
- Commonly used variables in performance tuning
- back\_log
- Database replication (live and off-line copying)
- Recovering an entire database
- Recovering grant tables
- Recovering from mysqldump vs. tar/cpio files
- Using update logs to replay post-backup queries
- Editing update logs to avoid replaying erroneous queries

**MySQL Security**

- Assessing risks and threats
- Internal security: data and directory access

- Directory's location
  - Structure of the Data Directory
  - How mysqld provides access to data
  - Running multiple servers on a single Data Directory
  - Database representation
  - Table representation (form, data and index files)
  - OS constraints on DB and table names
  - Data Directory structure and performance, resources, security
  - MySQL status files (.pid, .err, .log, etc)
  - Relocating Data Directory contents
- Managing MySQL User Accounts**
- Creating new users and granting privileges
  - Determining who can connect from where
  - Who should have what privileges?
  - Administrator privileges
  - Revoking privileges
  - Removing users
- Maintaining MySQL Log Files**
- The general log
  - The update log
  - Rotating logs
  - Backing up logs
  - delayed\_queue\_size
  - flush\_time
  - key\_buffer\_size
  - max\_allowed\_packet
  - max\_connections
  - table\_cache
  - Erroneous use of record\_buffer and sort\_buffer
  -
- Access to database files and log files
  - Securing both read and write access
  - Filesystem permissions
  - External security: network access
  - Structure and content of the MySQL Grant Tables
  - user, db, host, tables\_priv, columns\_priv
  - Grant table scope fields/columns
  - Grant table privilege columns
  - Database and table privileges: ALTER, CREATE, DELETE, DROP, INDEX, INSERT, SELECT, UPDATE
  - Administrative privileges: FILE, GRANT, PROCESS, RELOAD, SHUTDOWN
  - Server control over client access: matching grant table entries to client connection requests and queries
  - Scope column values: Host, User, Password, Db, Table\_name, Column\_name
  - Query access verification
  - Scope column mismatching order
  - Grant table risks: the FILE and ALTER privileges
  - Setting up users without GRANT
  - The anonymous user and sort order
- MySQL Database Maintenance and Repair**
- Checking and repairing tables
  - Invoking myisamchk and isamchk
  - Extended checks
  - Standard table repair
  - Table repair with missing/damaged index or table description
  - Avoid server-checking interaction, without shutdowns
  - Internal and external locking
  - Locking for checks and locking for repairs
  - Speeding up checks
  - Scheduled checks and preventive maintenance with cron
  - Automated

## B. Practicals

### **Obtaining and Installing MySQL**

- Choosing what else to install (e.g. Apache, Perl +modules, PHP)
- Which version of MySQL (stable, developer, source, binary)
- Creating a user account for the MySQL user and group
- Download and unpack a distribution
- Compile source code and install (or rpm)
- Initialize the data directory and grant tables with `mysql_install_db`
- Starting the server
- Installing Perl DBI support
- Installing PHP
- Installing Apache
- Obtaining and installing the `samp_db` sample database

### **Running Multiple MySQL Servers**

- For test purposes
- To overcome OS limits on per-process file descriptors
- Separate servers for individual customers (e.g. ISPs)
- Configuring and installing separate servers
- Procedures for starting up multiple servers

### **Updating MySQL**

- Stable vs. development releases
- Updates for both streams
- Using the "Change Notes"
- Bug fixing vs. new features
- Dependencies on the MySQL C client library (PHP, Apache, Perl DBD::mysql)

## 14. **Recommended Text**

- DuBois Paul, (January 17, 2003), *MySQL, Second Edition* **Publisher:** Sams
- Welling Luke, (February 12, 2003), *PHP and MySQL Web Development, Second Edition* **Publisher:** Sams
- Widenius Michael, Axmark David, (June 2002), *MySQL Reference Manual, 1st Edition, MySQL AB* **Publisher:** O'Reilly & Associates

## **Backing Up, Copying, and Recovering MySQL Databases**

- Methods: `mysqldump` vs. direct copying
- Backup policies
- Scheduled cycles
- Update logging
- Consistent and comprehensible file-naming
- Backing up the backup files
- Off-site / off-system backups
- Backing up an entire database with `mysqldump`
- Compressed backup files
- Backing up individual tables
- Using `mysqldump` to transfer databases to another server
- `mysqldump` options (flush-logs, lock-tables, quick, opt)
- Direct copying methods

## **Starting Up and Shutting Down the MySQL Server**

- Securing a new MySQL installation
- Running `mysqld` as an unprivileged user
- Methods of starting the server
- Invoking `mysqld` directly
- Invoking `safe_mysqld`
- Invoking `mysql.server`
- Specifying startup options
- Checking tables at startup
- Shutting down the server
- Regaining control of the server if you can't connect

# **MySQL Reference Manual**

**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology  
2 **Course** : Computer Graphics  
3 **Year** : Four  
4 **Code** : IMG-482  
5 **Semester** : One  
6 **Presented to** : Faculty of Applied Studies  
7 **Presented by** : Department of Computing and Information Technology  
8 **Lecture hours per week** : 1  
9 **Practical hours per week** : 2  
10 **Method of Assessment** : 60% examinations and 40% course work  
11 **Aim of Study**

*The aims of this course is to introduce students to computer graphics and use of modern graphics editors*

• **Objectives of study**

At the end of the course students will be able to

- a) Create computer graphics for the web and desktop publishing using graphics editors such as Flash, Shockwave etc.
- b) Use graphical devices, software and facilities available to create, manipulate and publish graphics.

• **Topics of Study**

**A. Lectures**

**Introduction to Computer Graphics**

- Types of computer graphics
- techniques for manipulating computer graphics
- image processing

**Hardware for Computer Graphics**

- input devices
- output devices
- interactive devices

**Application of Computer Graphics**

- business graphics
- Scientific graphics and animations
- Web presentations

**B. Practicals**

**Software for Computer Graphics**

- Recent software and packages in the following categories: drawing, animation, photo editing, presentations, Streaming video etc.

**14. Prescribed test Text**

- Salmon, R., *Computer Graphics Systems and Concepts*, 1987, Addison-Wesley.

**15. Recommended Text**

- Slater, M., 1998, *Computer graphics and Virtual Environments*, Addison-Wesley.
- Vince, J., 1992, *3D Computer Animation*, Addison-Wesley.
- Watt, A., 1992, *3D Computer Graphics* 2<sup>nd</sup> ed., Addison-Wesley.
- Angel, E., 1997, *Interactive Computer graphics: A Top-down Approach with Open GL*, Addison-Wesley.
- Burger, P., 1998, *Interactive Computer Graphics* 2<sup>nd</sup> ed., Addison-Wesley.
- Harris, D., 1984, *Computer Graphics and Applications*, London, Chapman & Hall.
- Harrington, S., 1983, *Computer Graphics: A Programming Approach*, New York, McGraw-Hill.

**YEAR 4 SEMSTER 2**  
**UNIVERSITY OF MALAWI – THE POLYTECHNIC**

**SYLLABUS**

- 1 **Programme** : Bachelor of Science in Information Technology
- 2 **Course** : Advanced Linux Server Administration
- 3 **Year** : Four
- 4 **Code** : UNX-400
- 5 **Semester** : Two
- 6 **Presented to** : Faculty of Applied Studies
- 7 **Presented by** : Department of Computing and Information Technology
- 8 **Lecture hours per week** : 2
- 9 **Practical hours per week** : 2
- 10 **Method of Assessment** : 60% examinations and 40% course work

**Aim of study**

The aim of this course is to provide a good grounding in a Linux Server setup and maintenance

**Objectives of Study**

At the end of the course students should be able to

- (a) configure and maintain a typical Linux System
- (b) Troubleshoot typical server application errors

**Topics of study**

**A. Lectures**

- Advanced Network Configuration and Troubleshooting
- Using Sendmail and Managing Mail Traffic
- Serving news
- Basic BIND configuration
- Securing a DNS server
- Implementing and Maintaining a web server
- Implementing a proxy server
- TCP wrappers
- Troubleshooting and network issues

**B. Practicals**

- Create and maintain DNS zones
- DHCP configuration
- NIS configuration
- LDAP configuration
- PAM authentication
- Configuring router functionality
- Configuring mailing lists

**Recommended Text**

- Nemeth Evi, Snyder Garth, Hein Trent R., Boggs Adam, (March 25, 2002)  
Linux Administration Handbook, 1st edition, Publisher: Prentice Hall

- Negus Christopher Red Hat Linux 8 Bible, (October 17, 2002), Book and CD-ROM edition, Publisher: John Wiley & Sons edition
- Turner Michael, Shah Steve, (January 7, 2003), Red Hat Linux Administration: A Beginner's Guide Publisher: McGraw-Hill Osborne Media;
- Hunt Craig, (August 9, 2002), Linux Network Servers (Craig Hunt Linux Library), 1st edition, Publisher: Sybex

## UNIVERSITY OF MALAWI – THE POLYTECHNIC

### SYLLABUS

- 1 **Programme** : Bachelor of Science in Information Technology
- 2 **Course** : Computer Security and Firewalls
- 3 **Year** : Four
- 4 **Code** : UNX-401
- 5 **Semester** : Two
- 6 **Presented to** : Faculty of Applied Studies
- 7 **Presented by** : Department of Computing and Information Technology
- 8 **Lecture hours per week** : 2
- 9 **Practical hours per week** : 2
- 10 **Method of Assessment** : 60% examinations and 40% course work
- 11 **Aim of study**

#### 12 Objectives of Study

#### 13 Topics of study

- Fundamentals of Computer Security
- Aspects of Security (cause and effects, Reconditions etc.)
- Risk management
- Elements of Computer and networks prone to risks
- Security Models
- System Security through Software tools (User Authentication, file protection, Access controls, Virus protection, Firewalls, OS and Network specific tools)
- Network Security
- Network Security Applications (mail, Web security etc.)
- Database Security

#### B. Practicals

- Firewall components and Packet filtering Exercise:
- Configuring a packet filter
- Firewall implementations
- Firewalls and network security
- Proxies and gateways
- Database Security

#### 14. Recommended Text

- Stallings William, Network Security Essentials - Applications and Standards
- White Gregory B, Fisch Eric A, Pooch Udo W, Computer System and Network Security
- Hendry Mike, Practical Computer Network Security

**UNIVERSITY OF MALAWI – THE POLYTECHNIC  
SYLLABUS**

1	<b>Programme</b>	: Bachelor of Science in Management Information Systems and Information Technology
2	<b>Course</b>	: Main Project
3	<b>Year</b>	: Four
4	<b>Code</b>	: PRJ-480
5	<b>Semester</b>	: One & Two
6	<b>Presented to</b>	: Faculty of Applied Studies
7	<b>Presented by</b>	: Department of Computing and Information Technology
8	<b>Lecture hours per week</b>	: 0
9	<b>Practical hours per week</b>	: 10

**10 Method of Assessment**

The marking scheme is based upon the following categories :

- Understand the Problem, Completion of project and, Quality of work (40%)
- Produce a Solution
  - Preparation of Solution (15%)
  - Delivery of Solution (15%)
- Evaluate the Solution (10%)
- Write up of the Work (15%)
- Reflect on the Project Experience (5%)

**11 Aim:**

The main aim of this exercise is to provide the opportunity for students to demonstrate independence and originality in planning and organizing a larger project over a long period and to put into practice some of the techniques they have been taught throughout the programme. This will show the individuality and inspiration of the student.

**12. Objectives**

At the end of the project students should have learned how to

- a) carry out research on a topic and summarizing it,
- b) specifying a piece of work,
- c) designing and developing appropriate tests to ensure a specification was satisfied

**13. Guidelines**

**The Project Coordinator**

There will be a Project Coordinator who will be responsible for the overall organization of the final year individual projects. Each project will have a supervisor who would guide a particular student throughout the project.

**Choosing an Individual Project**

The idea for the project may be a proposal from a member of staff or the students own, or perhaps a combination of the two. Students will be encouraged to discuss the projects that interest them with the supervisors. This will be done early in the first semester to ensure that there is plenty of time to think about the best choices.

If a student has an idea for an individual project it will be the responsibility of the student to find a member of staff who both approves of the proposed programme of work and is willing to supervise. The Project Coordinator could assist in finding a suitable supervisor.

There projects will require a clear demonstration of sound background research work, solid implementation, or piece of theoretical work, and a thorough evaluation of the project's output in both absolute and relative terms. A crucial component is the project report is expected to be well-structured and well presented, detailing the project's background, objectives and achievements. A demonstration of the final results will be required.

**14. Recommended Text**

None. But students will be expected to use the Internet Search Engines available to obtain relevant information