IQY Technical College's Professional Diploma in Engineering Curriculum

COURSE STRUCTURE

Year	Course	Total Credit Point
	Entry –Year 10	
	Year 11—Bridging Program	
	Year 12-- Certificate in Pre-vocational Studies	
1	Diploma in Engineering (Electrical/Civil/Mechanical)	30
	Award- Diploma in Engineering	30
2	Advanced Diploma in Engineering (Electrical/Civil/Mechanical)	30
	Award- Advanced Diploma in Engineering	60
3+4	Professional Diploma in Engineering (Electrical/Civil/Mechanical/Mechatronics/Building Services) (Electrical/Civil/Mechanical with Renewable Energy)	60
	Award-Professional Diploma in Engineering	120
	Total years spent after Year 10	6 Years

- The entry qualification for IQY Technical College's courses is Year 12 (International) Standard.
- The students who have completed Year 10 Examination require the Year 11+12 Level bridging study before commencing the major programs.
- Year 11+12 is standardized with Australian NSW Year 12 curriculum.

Please refer_ http://www.highlightcomputer.com/y712lessons.htm for details

IQY Technical College's Professional Diploma in Engineering Curriculum

Professional Diploma in Engineering Programs of IQY Technical College are designed at the same standard of relevant Bachelor of Engineering degrees.. Although the word "Bachelor of Engineering" is utilized, the award of IQY Technical College is Professional Diploma in Engineering.

Bachelor of Engineering (Electrical)

Bachelor of Engineering (Civil)

Bachelor of Engineering (Mechanical)

Bachelor of Engineering (Civil-Building Services)

Bachelor of Engineering (Mechanical-Mechatronics)

Bachelor of Applied Science (Information Technology)

Bachelor of Business

Professional Diploma/ Bachelor of Engineering (Electrical)

YEAR 3 +4

BACHELOR OF APPLIED ENGINEERING (ELECTRICAL)

Subjects	Points	Competency Units
BAE 401 Advanced Engineering Mathematics	9	Maths 301 Introduction to Complex Variables (1 pt) Maths 302 Elementary Linear Algebra (1 pt) Maths 401 Continuous Distributions (1 pt) Maths 402 Discrete Distributions (1 pt) Maths 403 Engineering Mathematics (1 pt) Maths 501 Introduction to Probability(1 pt) Maths 501 Linear Algebra & Matrices (1 pt) Maths 502 Finite Difference Methods for Partial Differential Equations & Mathematical Modelling (1 pt) Maths 601 Random Variables (1 pt)

BAE 402 Calculus	3	Maths 304 Integration and Differential Equations. (1 pt) Maths 403 Second Order Ordinary Differential Equations (1 pt) Maths 303 Engineering Mathematics (1 pt)
BAE 403 Engineering Mechanics	1	ME 301 Applied Mathematics (1 pt)
BAE 404 Engineering Materials & Thermodynamics	3	ME 334 Engineering Thermodynamics (1 pt) ME 434 Wind Turbines (1 pt) ME 634 Pneumatics (1 pt)
BAE 405 Advanced Circuit Analysis	3	EE 301 Electrical Circuits (1 pt) EE 303 Engineering Circuit Analysis (1 pt) EE 404 Electrical Measurement (1 pt)
BAE 406 Electro-mechanics	2	EE 502 Electrical Machines (1 pt) ME 301 Machine Principle (1 pt)
BAE 407 Advanced Electro-magnetics Field & Materials	1	EE 407 Electromagnetism (1 pt)
BAE 408 Analogue & Digital Electronics	5	EE 403 Introduction to Electronic Engineering (1 pt) EE 524 Power Electronics & Applied Electronics (1 pt) EE 405 Digital System (1 pt) EE 526 Digital Signal Processing (1 pt) EE 527 Digital Image Processing 1/ 2 (1 pt)
BAE 501 Advanced Power Systems & Power Transmission Networks	3	EE 512 Power System (1 pt) EE 302 Power System Technology (Optional) EE 402 Electrical Power (1 pt) EE 513 Power Transmission and Distribution Lines (1 pt)
BAE 502 Linear System	1	EE 304 Computer Mathematics (1 pt)
BAE 503 Control System	4	EE 601 Non Linear Control Applications (1 pt)

		EE 601 Control Engineering , Feedback and Control System , P ID_Control (1 pt) EE 624 Process Control (1 pt) ME 534 Numerical Control Part 1 / 2 (1 pt)
BAE 504 Power System Analysis	1	EE 614 Power System Analysis
BAE 505 Power System Optimization	1	EE 613 Power System Optimization
BAE 506 Power System Stability & Protection	**2**	EE 615 Power System Stability & Power Quality (1 pt) EE 616 Power System Protection (1 pt)
BAE 507 Electro-mechanical Energy Conversion	2	EE 602 Motor Control Electronics (1 pt) ME 434 Mechtronics & Robotics (1 pt)
BAE 508 Industrial Engineering & Industrial Management	1	Mgt 501 Basic Management & Communication Skills (1 pt)
BAE 601 Computer Programming	3	IT 401 Object Oriented Programming (1 pt) IT 402 Structured Programming (1 pt) IT 403 Visual Basic Programming (1 pt
BAE 602 Computer Network	1	ICT 202 Information Systems Principles and Networking (1 pt)
BAE 603 Software Engineering	3	ICT 106 Software Engineering (1 pt) ICT 203 Information Systems, Analysis and Design (1 pt) EE 626 Nano Technology (1 pt)
BAE 604 Telecommunication Engineering	2	EE 525 Data Communication (1 pt) EE 603 Electronics Telecommunication (1 pt)
BAE 605 Engineering Management	5	Mgt 502 Operation Management (1 pt) Mgt 503 Production & Operation Management (1 pt) Mgt 504 Project Management (1 pt)

		Mgt 505 Quality Management and Manufacturing Engineering (1 pt) Mgt 506 Strategic Financial Management (1 pt)
BAE 606 Building Service Electrical & Mechanical Engineering	2	EE 617 Building Electrical and Mechanical System (1 pt) ME 334 Airconditioning and Refrigeration (1 pt) CE 301 Building Construction (Optional) CE 301 Conceise Hydroulics (Optional)
BAE 607 Radio Wave Propagation & Microwave Techniques	2	EE 625 Radio Wave Propagation (1 Pt) EE 626 Microwave Technique (1pt)
Total Credit points	60	
Credit Points given for Advanced Diploma in Electrical Engineering (Year 1+2)	60	
Total credit points	120	

The renewable energy subjects can be substituted for some subjects

Renewable Energy Subjects

View http://www.highlightcomputer.com/BEElectricalNew.pdf for the Professional Diploma in Engineering Combined with Renewable Energy Subjects

View http://www.highlightcomputer.com/re.pdf for detailed contents

Professional Diploma in Electrical Engineering with Renewable Energy

Common Year 3

1. BAE 401 Advanced Engineering Mathematics (9 pt)

2. BAE 402 Calculus (3 pt)

3. BAE 403 Engineering Mechanics (1 pt)

4. BAE 404 Engineering Materials & Thermodynamics (3 pt)

5. RE001- Foundation Studies in Renewable Energy and Sustainability (2 pt)

6. .RE003- Solar and Thermal Energy Systems (2 pt)

7. RE004- Energy Storage Systems (2 pt)

8. RE005- Renewable Energy Resource Analysis (2 pt)

9. RE006- Wind Energy Conversion Systems (2 pt)

10. RE010-Engineering Materials (2 pt)

11. RE012a-Electrical Engineering Part 1 (2pt)

12. RE016-Design& Management (BAE508) (2 pt)

B Applied Engg (Electrical)

YEAR 4 (Specialized)

1. BAE 601 Computer Programming

2. BAE 602 Computer Network

3. BAE 603 Software Engineering

4. RE012b-Electrical Engineering Part 2

5. RE002- Grid Connected Photovoltaic Power Systems

6. RE013-Electrical Machines

7. RE014-Electronics Control

8. RE015-Electrical Project/ Practice

9. BAE 501 Advanced Power Systems & Power Transmission Networks

10. BAE 506 Power System Stability & Protection

11. BAE 604 Telecommunication Engineering

12. RE007- Energy System Efficiency

Professional Diploma/ Bachelor of Engineering (Civil)

Year (3) Part 1 ADVANCED GENERAL CIVIL ENGINEERING DEGREE LEVEL (17 pt)

Subjects
BAE 401 Advanced Engineering Mathematics (9 pt)
BAE 402 Calculus (3 pt)
BAE 403 Engineering Mechanics (1 pt)
BAE 404 Engineering Materials & Thermodynamics (3 pt)
BAE 508 Industrial Engineering & Industrial Management (1 pt)
The renewable energy subjects can be substituted for some subjects **Renewable Energy Subjects** **View** http://www.highlightcomputer.com/BEElectricalNew.pdf for the Professional Diploma in Engineering Combined with Renewable Energy Subjects **View** http://www.highlightcomputer.com/re.pdf for detailed contents

Year (3) Part 2 ADVANCED GENERAL CIVIL ENGINEERING DEGREE LEVEL (18 Pt)

BAE421 Building Construction Engineering (4 pt)

BAE422 Estimating (2 pt)

BAE423 Fluid Mechanics (2 pt)

BAE424 Reinforced Concrete (2 pt)

BAE425 Timber Engineering (2 pt)

BAE521 Road & Bridge (2 pt)

BAE522 Rock Mechanics (2 pt)

BAE523 Soil Mechanics (2 pt)

BAE 523A Environmental Engineering (2 pt)

Year (4) Part 1 (17 pt)

BAE 601 Computer Programming (3 pt)
BAE 605 Engineering Management (5 pt)
BAE 606 Building Service Electrical & Mechanical Engineering (2 pt)
BAE 609 Design Project (3 pt)
Total Credit points in this group

Year (4) Part 2

(12 Pt)

BAE621 Structural Engineering (3 pt)

BAE623 Surveying& Traffic Engineering (2 pt)

BAE624 Water Supply , Sanitation & Finishing (2 pt)

BAE 608 Engineering Competency Demonstration Report Writing (2pt)

SELF STUDY

BAE622 Architecture (3 pt)

Total points for Year 3+4= 60 pt

Advanced Diploma in Civil Engineering= 60 pt

Total= 120 pt

Professional Diploma in Civil Engineering with Renewable Energy

Common Year 3

1. BAE 401 Advanced Engineering Mathematics (9 pt)

2. BAE 402 Calculus (3 pt)

3. BAE 403 Engineering Mechanics (1 pt)

4. BAE 404 Engineering Materials & Thermodynamics (3 pt)

5. RE001- Foundation Studies in Renewable Energy and Sustainability (2 pt)

6. .RE003- Solar and Thermal Energy Systems (2 pt)

7. RE004- Energy Storage Systems (2 pt)

8. RE005- Renewable Energy Resource Analysis (2 pt)

9. RE006- Wind Energy Conversion Systems (2 pt)

10. RE010-Engineering Materials (2 pt)

11. RE012a-Electrical Engineering Part 1 (2pt)

12. RE016-Design& Management (BAE508) (2 pt)

Total points for Year 3-(32 Pt)

B Applied Engg (Civil)

YEAR 4 (Specialized)

Total points for Year 4-(24 Pt)

1 RE011a-Civil& Mechanical Engineering Part 1 (2 pt)

(Assessment- Study Report)

2 RE011b-Civil& Mechanical Engineering Part 2a (2 pt)

(Assessment- Study Report)

3 BAE 606 Building Service Electrical & Mechanical Engineering (2 pt)

4BAE421 Building Construction Engineering (2 pt)

5 BAE422 Estimating (2 pt)

6 BAE423 Fluid Mechanics (2 pt)

7 BAE424 Reinforced Concrete (2 pt)

8 BAE522 Rock Mechanics (2 pt)

9 BAE 523A Environmental Engineering (2 pt)

10BAE621 Structural Engineering (2 pt)

11BAE623 Surveying & Traffic Engineering (2 pt)

12BAE624 Water Supply , Sanitation & Finishing (2 pt)

Commmon Graduating Units (Year 5)

13 BAE 605 Engineering Management (4 pt)

14 BAE 608 Engineering Competency Demonstration Report

Total points for Year 3+4+ Final graduating subjects = 32+28+4= 60 pt

Professional Diploma/ Bachelor of Engineering (Mechanical)

Year (3)

GENERAL APPLIED ENGINEERING (MECHANICAL) DEGREE (29pt)

Subjects
BAE 401 Advanced Engineering Mathematics (9 pt)
BAE 402 Calculus (3 pt)
BAE 403 Engineering Mechanics (1 pt)
BAE 404 Engineering Materials & Thermodynamics (3 pt)
BAE 507 Electro-mechanical Energy Conversion (2 pt)
BAE 508 Industrial Engineering & Industrial Management (1 pt)
BAE511 Air-conditioning & Refrigeration Part 1 (2 pt)
BAE613 Mechanical Instrumentation Process (2 pt)
BAE614 Machine Design (2 pt)
BAE512 Building Service Water Supply System (2 pt)
BAE511 Air-conditioning & Refrigeration Part 2 (2 pt)
Renewable Energy Subjects **View** http://www.highlightcomputer.com/BEElectricalNew.pdf for the Professional Diploma in Engineering Combined with Renewable Energy Subjects **View** http://www.highlightcomputer.com/re.pdf for detailed contents

Year (4) Part 1 BE (Mechanical + General Related Subjects) (15pt)

BAE 601 Computer Programming(3 pt)
BAE 602 Computer Network (1 pt)
BAE 603 Software Engineering (3 pt)
BAE 605 Engineering Management 5 pt
BAE 606 Building Service Electrical & Mechanical Engineering (3 pt)

Year (4) Part 2

Bachelor of Engineering (Mechanical) Specialization (13 pt)

BAE311 Plant Engineering (2 pt)

BAE312 Design Engineering (2 pt)

BAE313 Environmental Control (2 pt)

BAE314 Mechanical Power Generation (2 pt)

BAE315 Materials Engineering (2 pt) Part 1 Part 2

BAE 608 Engineering Competency Demonstration Report Writing (3 pt)

Elective (3pt)

Subjects
BAE513 Production Technology
BAE611 Maintenance Engineering
BAE612 Engineering Metallurgy

Total point for Year 3+Year 4 Part ½+Elective = 60 pt

Advanced Diploma in Mechanical Engineering= 60 pt

Total credit points= 120 pt

The renewable energy subjects can be substituted for some subjects

Renewable Energy Subjects

View http://www.highlightcomputer.com/BEElectricalNew.pdf for the Professional Diploma in Engineering Combined with Renewable Energy Subjects

View http://www.highlightcomputer.com/re.pdf for detailed contents

Professional Diploma in Mechanical Engineering with Renewable Energy

Common Year 3

1. BAE 401 Advanced Engineering Mathematics (9 pt)

2. BAE 402 Calculus (3 pt)

3. BAE 403 Engineering Mechanics (1 pt)

4. BAE 404 Engineering Materials & Thermodynamics (3 pt)

5. RE001- Foundation Studies in Renewable Energy and Sustainability (2 pt)

6. .RE003- Solar and Thermal Energy Systems (2 pt)

7. RE004- Energy Storage Systems (2 pt)

8. RE005- Renewable Energy Resource Analysis (2 pt)

9. RE006- Wind Energy Conversion Systems (2 pt)

10. RE010-Engineering Materials (2 pt)

11. RE012a-Electrical Engineering Part 1 (2pt)

12. RE016-Design& Management (BAE508) (2 pt)

Total points for Year 3-(32 Pt)

YEAR 4 (Specialized)

1. RE011a-Civil & Mechanical Engineering Part 1 (2 pt)

(Assessment- Study Report)

2. RE011b-Civil & Mechanical Engineering Part 2a (2 pt)

(Assessment- Study Report)

3. BAE 606 Building Service Electrical & Mechanical Engineering (2 pt)

4. BAE311 Plant Engineering (2 pt)

5. BAE314 Mechanical Power Generation (2 pt)

6. BAE315 Materials Engineering (2 pt) Part 1 Part 2 (2 pt)

7. BAE511 Air-conditioning & Refrigeration Part 1 (2 pt)

8. BAE512 Building Service Water Supply System (2 pt)

9. BAE613 Mechanical Instrumentation Process(2 pt)

10. BAE614 Machine Design (2 pt)

11. RE007- Energy System Efficiency(2 pt)

12. BAE 601 Computer Programming(2 pt)

Total points for Year 4-(24 Pt)

Common Graduating Units (Year 5)

13 BAE 605 Engineering Management (4 pt)

14 BAE 608 Engineering Competency Demonstration Report

Total points for Year 3+4+ Final graduating subjects = 32+28+4= 60 pt

Professional Diploma/ Bachelor of Engineering (Civil-Building Services)

STAGE (3) BASIC ELECTRICAL & ELECTRONICS ENGINEERING (18 Pt)

REFER DIPLOMA/ADVANCED DIPLOMA IN ELECTRICAL ENGINEERING DETAILED CONTENTS

EE101 DC Circuit Problems

EE102 Basic Electrical Fitting& Wiring

EE103 Basic Electrical Drafting

EE104 Electrical Equipments Safety Protection

EE105 Electrical Installation Design

EE107 Electrical Equipments

EE106 Advanced Electrical Wiring

EE108 Electrical Fault Finding

EE109 Electrical Control Circuits

EE111 Electromagnetism & Basic Electrical Machines

EE112 Alternating Current Principle

EE113 Electrical Fundamental

EE115 Basic Analogue & Digital Electronics

EE116 Process Control System

EE117 Solar Electrical System

EE119 Electrical Risk Assessment

EE120 Electrical Contracting& Specifications

EE308 Sustainability

STAGE (4 A) ADVANCED MECHANICAL ENGINEERING STUDY (6Pt)

REFER DIPLOMA/ADVANCED DIPLOMA IN MECHANICAL ENGINEERING DETAILED CONTENTS

ME 102 Engineering Thermodynamics

ME 109 Engineering Drawing

ME 107 Heat Transfer

ME 201 Introduction to Fluid Mechanics

ME 204 Engineering Fluid Mechanics

ME 301 Fluid Dynamics

STAGE (4B)ADVANCED ELECTRICAL & ELECTRONICS ENGINEERING STUDY

(ADVANCED DIPLOMA) (4 pt)

REFER DIPLOMA/ADVANCED DIPLOMA IN ELECTRICAL ENGINEERING DETAILED CONTENTS

EE201 Engineering Mathematics

EE204 Engineering Physics

EE302 Advanced Engineering Mathematics

EE307 Energy Efficient Building Design

STAGE (5)BACHELOR OF APPLIED ENGINEERING (BUILDING SERVICE) DEGREE (32 pt)

Subjects
BAE 401 Advanced Engineering Mathematics
BAE 402 Calculus
BAE 403 Engineering Mechanics
BAE 404 Engineering Materials & Thermodynamics
BAE 508 Industrial Engineering & Industrial Management

BAE 601 Computer Programming
BAE 605 Engineering Management
BAE 606 Building Service Electrical & Mechanical Engineering
BAE 609 Design Project

Professional Diploma/ Bachelor of Engineering (Mechanical-Mechatronics)

Advanced Diploma of Mechanical Engineering)

REFER DIPLOMA/ADVANCED DIPLOMA IN ELECTRICAL ENGINEERING DETAILED CONTENTS

REFER DIPLOMA/ADVANCED DIPLOMA IN MECHANICAL ENGINEERING DETAILED CONTENTS

(1) ME104 Principle of Machine

(2)EE624 Process Control

EE115 Basic Analogue& Digital Electronics

EE116 Process Control System

(3)ME 334 Airconditioning and Refrigeration

(4) ME202 Aerodynamics

(5) ME 302 Automation-and-Robotics

(6) ME 303 Computer Aided Design and Manufacturing

(7) ME 234 Wind Turbines

(8) ME 201 Introduction to Fluid Mechanics

(9) ME 204 Engineering Fluid Mechanics +

ME 301 Fluid Dynamics

(10) ME 206 Introduction to Turbo Machinery

(11)ME 205 Manufacturing Processes & Materials

(12) ME 207 Chemical Thermodynamics

(13)ME 208 Hydrocarbons

(14) ME 634 Pneumatics

(15) ME 203 Control

(16) ME 534 Numerical Control

(17) ME 434 Mechtronics-Robotics

(18)EE 617 Building Electrical and Mechanical System

(19)EE105 Electrical Installation Design

EE107 Electrical Equipments

EE105 Electrical Installation Design

EE107 Electrical Equipments

(20)EE106 Advanced Electrical Wiring

(21) EE116 Process Control

(22) EE117 Solar Electrical System

(23) EE119 Electrical Risk Assessment

EE120 Electrical Contracting

(24) ME 109 Engineering Drawing

EE301 Advanced Electrical Drafting

(25) EE121 Electronics Power Control Devices

(26) EE206 AC

(27) EE207 DC

(28)EE202 Electrical Circuits

(29)EE203 Three Phase Power Circuits

(30) ME 305 Corrosion Prevention

(31) ME 306 Theory-of-waves-in- materials

Degree Level

Subjects
BAE 401 Advanced Engineering Mathematics

BAE 402 Calculus
BAE 403 Engineering Mechanics
BAE 404 Engineering Materials & Thermodynamics
BAE 405 Advanced Circuit Analysis
BAE 406 Electro-mechanics
BAE 408 Analogue & Digital Electronics
BAE 502 Linear System
BAE 503 Control System
BAE 507 Electro-mechanical Energy Conversion
BAE 508 Industrial Engineering & Industrial Management
BAE 601 Computer Programming
BAE 602 Computer Network
BAE 603 Software Engineering
BAE 604 Telecommunication Engineering
BAE 605 Engineering Management
BAE 606 Building Service Electrical & Mechanical Engineering

Professional Diploma/Bachelor of Engineering (Electrical)

BAE 401 Advanced Engineering Mathematics (9 pt)

Subject Objective	This subject provides knowledge of mathematical methods needed for engineering problem solving
Learning outcome	The students develop both their thinking and problem solving skills. Topics covered are: vector, functions of a complex variable; algebra, differential equations, mathematical distribution, and applications of mathematics in engineering calculations.
Credit Point	9
Hours	216 Hrs
Assessment	Assignment/ Final Examination/Online MCQ Test

Contents

An Introduction to theory of complex variables
Complex numbers
Functions
Differentiability
Integration in the complex plane
Integral theorems
Power series
Introduction of rational functions of trigonometric functions.

Continuous distribution
Exponential distribution
Normal distribution
Gamma distribution
Convergence in distribution
F distribution

Discrete distribution
Binomial distribution
Poisson distribution

Elementary linear algebra
Algebra in F^n Example problems
Geometric meaning of vectors

Geometric meaning of vector addition
Distance between points in Rn Length of vector
Geometric meaning of scalar multiplication
Dot product
Cross product
System of equation geometry
System of equation – Algebric operation
Matrice arithmetic
Determinants –Basic technique & properties

Integration and differential equations
List of integrals
Introduction to background
Theorem of integration
Improper integrals
Improper integral problems
Integration of rational functions
Differential equations
First order ordinary differential equations
Homogenous equations
The general linear equations

Random variables
Simple introduction examples
Problems
Frequency and distribution functions in 1 dimension
Mathematical modelling preliminary
Introduction
Discrete time model
Maths 301 Introduction to Complex Variables
The residue Theorem
Fourier Transform
Integral theorem of complex analysis with applications
to the evaluation of real integral
Introduction
Integral theorems – The green Theorem
Cauchy's integral theorem
Cauchy's residue theorem

Maths 302 Elementary Linear Algebra
A formula for the inverse
Cramer's rule
Example 6.2.3 , 6.2.4 , 6.2.6, 6.2.7
Rank of a matrix

Example 8.2.9 , 8.2.10, 8.3.3 , 8.3.5, 8.3.6, 8.3.7, 8.3.8
Linear independence and bases
Linear transformation
Constructing the matrix of a linear transformation
Linear programming

Maths 401 Continuous Distribution

X^2 Distribution
F Distribution
F Distribution & " t " Distribution
Estimation of parameters

Maths 402 Discrete Distribution

Geometric distribution
Pascal distribution
Negative binomial distribution
Hyper geometric distribution

Maths 303 Essential Engineering Mathematics

Vectors and matrices
Functions and limits , Example problems
Calculation of one variable (Part 1) Differentiation,
Calculation of one variable (Part 1) Integration,
Calculus of many variables,
Ordinary differential equations,
Complex function theory

Maths 501 Introduction to probability

Theoretical background
Playing card
Binomial distribution
Lotto Example
Conditional probabilities –Baye's formula

Maths 501 Linear algebra and matrices

Linear transformation matrices
Definition 2.1.1 to 2.1.3
i j Entry of product Definition 2.1.8
Rank of matrices
Row operations

Maths 502 Introductory Finite Difference Method for PDE

Partial differential equations. Example problems

Taylor theorem
Iterative solution methods
Jacobi Iteration
Gauss Seidel Iteration
Successive Relaxation method

Maths 601 Random Variables

Theoretical results
Frequencies and distribution (1 dimension)
Function of random variables

BAE 402 Calculus (3 pt)

Subject Objective	This subject provides knowledge of calculus methods needed for engineering applications.
Learning outcome	The students develop both their thinking and problem solving skills. Topics covered are: vector calculus; functions of a complex variable; partial differential equations and boundary value problems; the concepts of quantum mechanics and Schrödinger's equation; and applications of mathematics in engineering calculations.
Credit Point	3
Hours	72
Assessment	Assignment/ Test/ Online MCQ Test

Contents

Calculus 1 a .pdf
Differentiation, Example problems
Integration, Example problems
Simple differential equations, Example problems

Calculus 2 a .pdf
Integration of trigonometric polynomials
Complex decomposition of a fraction between two polynomials
Chain rule
Calculation of the directional derivatives
An overview of integration in the plane and in the space
Line integrals
Surface integral
Green's theorem in the plane

Calculus 2b 1.pdf
The range of functions in several variables
Line integral
Space integral
Line integral

Calculus 3b. pdf
Power series method in solution of problems, Example problems

Calculus 3C 1. pdf
Sequence in general

Calculus 4C 1. pdf
Sum function of Fourier series
Maths 303 Engineering Mathematics
Introduction and background
Integration of rational functions
Integration of trigonometric functions
Differential equations

Maths 403 Second Order Differential Equations
Power series solutions
Bessel equations and Bessel functions
Legendre polynomials
Differential equations

BAE 403 Engineering Mechanics (1 pt)

Subject Objective	This subject builds on and brings together the concepts introduced in the Mathematical and Physical Modelling subjects and in Introduction to Mechanical and Mechatronics Engineering.
Learning outcome	It is intended to provide students with a comprehensive overview of elementary mechanics, and lay the basis for further work in this area in later subjects. In particular, material discussed in this subject is taken further in Machine Dynamics and Mechanics of Solids subjects in subsequent stages.
Credit Point	1
Hours	24 Hr of Lecture+ 48 Hr of Tutorials
Assessment	Assignment/ Test/ Online MCQ Test

Contents

Stress Example
Stress lectures
Strain All examples
Strain lessons
Mechanical properties of materials
Mechanical properties of materials
Axial members
Axial members
Torsion of shaft
Torsion of shaft
Symmetric bending of beams
Symmetric bending of beams
Deflection of symmetric beams
Deflection of symmetric beams
Stress transformation
Stress transformation
Strain transformation
Strain transformation
Design and failure
Design and failure
Stability of columns
Stability of columns
Newton motion

One dimensional motion

Simple harmonic motion

Damped oscillation

$X(t) = Ar\, e^{-rt/l} \cos(wt - \delta_r)$

Rotating reference frame equations
Modern Mechanics Part 1
Modern Mechanics Part 2
Modern Mechanics Part 3
Modern Mechanics Part 4
Modern Mechanics Part A
Modern Mechanics Part B
Modern Mechanics Part C

ME 301 Applied Mathematics
Kinematics
Projectiles
Forces
Resistance forces
Resolving forces
Rigid bodies
Centre of gravity
Momentum
Energy
Circular motion
Gravitation and planetary motion
The language of vectors

BAE 404 Engineering Materials & Thermodynamics (3 pt)

Subject Objective	Thermodynamics The objectives of this subject are to develop a fundamental understanding of applied thermodynamics in an engineering perspective, Strength of materials Strength of materials This subject draws on, and brings together, the knowledge and skills developed in earlier subjects such as Fundamentals of Mechanical Engineering, Chemistry and Materials Science, and Mechanics of Solids.
Learning outcome	Thermodynamics Use thermodynamics effectively in the practice of engineering, lay the groundwork for subsequent studies in the fields related to energy systems and increase an awareness and emphasis on energy resources and environmental issues. Strength of Materials It also prepares students for the more dedicated design subjects to come and exposes them to practical aspects of mechanical engineering design. The objectives are that students should be able to: understand, describe and use the methodology of modelling material properties and behaviour; understand and describe the fundamental differences in the behaviour of different types of materials; understand and describe how and why things fail; realise the importance of material selection in engineering design; predict, or design to avoid, failure given the material, environment and loading conditions; and use analytical skills in stress analysis and knowledge of material properties in mechanical design..
Credit Point	3
Hours	72 Hrs
Assessment	Assignment/ Test/ Online MCQ Test

Contents

Heat Transfer. pdf

(1) Heat transfer mode Example problems
(2) Conduction Example problems
(3) Convection Example problems
(4) Radiation Example problems
(5) Heat Exchanger Example problems

Theory of waves in materials.pdf

Materials-Preliminary
Materials- Basic mechanical properties
Basic wave phenomena
Harmonic waves
Elastic volume and shear waves
Rayleigh Elastic waves

Engineering Thermodynamics
General definition
Thermodynamics-Working fluids
Laws of Thermodynamics
Worked Example 3.1 to 3.25

ME434 Wind Turbines
Wind Energy
Theory of wind energy
Wind turbine types and components
Wind energy measurement, Wheel encoder Worked

ME634 Pnuematics
Principle of pneumatics
Linear actuators
Flow control
Pnuematics sensors
Pnuematics symbols

BAE 405 Advanced Circuit Analysis (3 pt)

Subject Objective	In this subject students are assumed to have knowledge of basic devices such as ideal and real voltage and current sources and loads; resistors; capacitors, inductors and coupled coils; diodes and operational amplifiers.
Learning outcome	To have basic circuit analysis skills such as Kirchhoff's current and voltage laws, Thevenin's and Norton's theorems, mesh and nodal analysis, symmetry, circuit transformation and superposition. Using this understanding as a starting point, the subject introduces the basic theoretical models that underpin signals and system analysis
Credit Point	3
Hours	72
Assessment	Assignment/ Test/ Online MCQ Test/ Online Simulated Practical

Contents

DC Circuit Analysis
Circuit Theory
Modulators
Analog, digital signals , electric current, power summary
Circuit analysis, electric potential, electric power, sign convection, electric source, Kirchoffs' law
Circult elements, characteristics KCL, KVL
Resistor (Series, parallel, wheatstone bridge, Nodal analysis
Nodal analysis, mesh analysis
Superposition theorem, Thevenin's theorem, Norton theorem, Maximum power transfer theorem,
Operational amplifier
Inverting amplifier circuit, Summing amplifier, Differential amplifier
Capacitor, Op-amp integrator, stored energy
Mutual inductance, time constant, transient
Transient response of 1 st order circuit, RL transient analysis, sequential switching
RC/RL Circuit , Propogation, Delay, DRAM
Semi conductor
PN Junction diode
Light emitting diode
MOSFET
Digital signal
CMOS Digital circuit
Combinational logic circuits
Flip flops
Propagation delay in timing diagram
Integrated circuit fabrication
Device isolation methods
Interconnected resistance and capacitance

Transistor scaling
Integrated circuit design for application in communications
Small signal amplifiers
Network noise intermodulation distortion
CAD for noise analysis
Snsors & Detectors
Low noise design methodology
Oscillators
Modulators and demodulators
Concepts in Electrical Circuit
Circuit theorem
Sinusoids & phasors
Frequency response

EE303 Engineering Circuit Analysis

Basic circuits

Basic Nodal and Mesh analysis

Linear and Superposition/ Source Transformation

RL/ RC Circuits

RLC Circuits

Sinusoidal steady state analysis

AC Power Circuit Analysis

Polyphase Circuits

Magnetically coupled circuits

Complex Frequency / Laplace Transform

Laplace Transform

Circuit analysis in “ S “ domain

Pole/ Zero constellation

Frequency Response

Two ports network

Fourier Circuit Analysis

Use of symmetry theory

EE404 Electrical Measurement (1 pt)
Measurement of inductance and capacitance
Measurement of resistance
Magnetic measurement
High voltage measurement and tesating
Location of cable fault
Measurement of power
Measurement of energy

BAE 406 Electro-mechanics (2 pt)

Subject Objective	The objectives of this subject are to consolidate fundamental knowledge of electric and magnetic fields; electric and magnetic circuits; how electric, magnetic and electromagnetic energy are interchanged;
Learning outcome	To model an electromechanical automation system using DC and AC motors and simulate its performance in open-loop and closed-loop control. Students also acquire skills in working with machines and equipment at normal mains supply voltage, in power instrumentation and control, PLCs and in experimental design and recording. Technical and theoretical content is expected to be acquired by students to the levels of 'know' (essential), 'familiar' (can solve problems if required) and 'aware' (have read/seen). Laboratory skills, ranging from electrical safety, measurements, design validation and experimental verification are an important focus of this subject.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test/ Online simulated Practical

Contents

Electro-mechanic -1.0.1 Scope of application

1.1 Electro-magnetic theory

1.1.1a Magnetic field system, Table 1.1

1.1.1.b Electric field system Table 1.2
Lumped electro-mechanical elements
Lumped parameter-electro-mechanic
Rotating machines
Lumped parameter-electro mechanical dynamics

EE 502 Electrical Machines

DC Generator, Example problems
DC Motors, Example problems
Efficiency & heating of electrical machines, Example problems
Three phase transformer, Example problems
Three phase induction motors, Example problems
Synchronous generators, Example problems
Synchronous motors, Example problems

Basic of industrial motor control, Example problems

ME 301 Machine Principle

Rotating machines
Machinery mounting
Balancing
Bearing
Power transmission

BAE 407 Advanced Electro-magnetics Field & Materials (1 pt)

Subject Objective	The objectives of this subject are to consolidate fundamental knowledge of electric and magnetic fields; electric and magnetic materials
Learning outcome	To understand how electric, magnetic and electromagnetic energy are interchanged.
Credit Point	1
Hours	24 + Tutorial 2 hr/ week
Assessment	Assignment/ Test/ Online MCQ Test

Contents

Electric field
Electrostatic potential
Dipole and quadrature pole movements
Batteries, resistors, ohm laws
Capacitors
Magnetic effect of an electric current
Force on current in a magnetic field
Electro-dynamics of moving bodies
Magnetic potential
Electro-magnetic Induction
Dimensions
Properties of magnetic materials
Alternating current
Laplace transform
Maxwell Equation
CGS Electricity & Magnetism
Magnetic dipole movement
Outlines
Electric field
Electrostatic Energy
Laplace's equation (1)
Laplace's equation (2)
Remarks on units
Green's functions
Multipole expansion
Electro-static in matter
Boundary condition
Magneto statics (1)
Magneto statics (2)
Macroscopic magneto statics
Maxwell's equation
DISC movement
Electro-magnetic plane waves
Reflection & refraction

Casual relation between D & E
Wave guides and load cavities
Electromagnetic radiation and scattering (1)
Electromagnetic radiation and scattering (2)
Scattering by small di-electric sphere
Electro-magnetism
Electro magnetic fields and moving charges
Multipole expansion
Magnetic constants and materials
Ampere law
Brief history of electro magnetism
Gauss's law
Numerical solutions to Laplace's equation
Small current loop
Curvilinear co-ordinate system
Problems
Dielectric tensors and constants
Analytic solution to Laplace equation
Magnetostatic boundary condition
Electrostatic boundary condition
Electromagnetic field
The gradient vector
Maxwell's equation

Electro-magnetic wave propagation
BAE 407 Advanced Electro-magnetic Field & Materials
Electro dynamics
Introduction to electro statics
Boundary value problems in electro statics (1)
Boundary value problems in electro statics (2)
Multi-poles Macroscopic media –Dielectrics
Static and stationary magnetic fields
Maxwell's equations
Plane wave and wave propogation
Wave guides and cavities
Radiation
The special theory of relativity
Particles and field dynamics
Charged particle collisions-Energy loss, Scattering
Radiation by moving charges

BAE 407 Advanced Electro-magnetic Field& Materials

EMFT book.pdf
Summary of electro statics
Potential
Electro-magnetics waves
Classical optics
Conservation Law

Conservation Law
Conservation Law
Generic wave
Electromagnetic waves in vacuum
Electromagnetic waves in matter
Electromagnetic waves in conductor
Electromagnetic waves propagation
Electromagnetic waves field
Wave guides
Electromagnetic waves radiation
Electro-dynamics
Frequency

EE407 Electro-magnetism

Di-electric materials and capacitance
Transmission Lines
Maxwell's equations and electro-magnetic waves

Electrostatics

Di-electric

Transmission Line

Maxwell Equation

BAE 408 Analogue & Digital Electronics (5 pt)

Subject Objective	Analogue The main objective of this subject is to familiarise students with basic electronic circuits, mainly with op-amps as active elements, and their applications. Digital The objectives of this subject are to enable students to master the fundamentals of digital and programmable electronic circuits and their engineering applications; master the hardware architecture of a typical small computer system; and understand the principles of low-level programming and gain an ability to write simple assembly code.
Learning outcome	Analogue By the end of the subject, students should have acquired reasonable proficiency in the analysis of basic electronic circuits and be able to build and test circuits in the laboratory. Particular emphasis is placed on the practical, hands-on aspect of electronics to provide a solid foundation of working knowledge for basic analog electronic circuits using op-amps. Laboratory work is a significant proportion of in-class delivery so as to make students proficient in circuit construction, testing, troubleshooting and to give them a sound knowledge of the use of test instruments. Another objective is to show that practical electronic applications are relevant to other engineering and technical disciplines and may often be placed within a wider social or commercial context. Digital Students are introduced to the basics of concurrent and real-time application programming. Topics include digital sequential circuits; state diagram and its application in the design of digital circuits; basic hardware architectures of the digital computer in terms of its building blocks; how hardware integrates with software at the machine level; low-level language programming; internal architecture and design of a typical register-based central processing unit and a main memory subsystem, and their interdependence; concepts of computer system buses, as well as different types of input and output devices; interrupts; input and output; micro-controller theory; and hardware interfacing design techniques.
Credit Point	5
Hours	120
Assessment	Assignment/ Test/ Online MCQ Test/ Online Simulated Practicals

Contents

Semi conductor devices

Digital circuits

Power Electronics Converters

Introduction to Electronic Engineering

Power Electronics & Applied Electronics

Digital System

Digital Signal Processing

Digital Image Processing

Electronics Circuits

Power Electronics Control

Digital System

Number system basics
Introduction to logic gates
Combinational logic
Karnaugh map
Arithmetic circuit
Coders/ Multiplexers
Counters

Digital Signal Processing

Signal system representation
Fourier/ Z Transform
Discrete Fourier Transform
Principle of filter design
FIR filter design

Digital Image Processing

Introduction
Intensity transformation & spatial filtering
Filtering in frequency domain
Discrete Fourier Transform
Butterworth Low Pass Filter
Butterworth High Pass Filter
Image restoration / Noise analysis

Digital Image Processing

Introduction
Intensity transformation & spatial filtering
Filtering in frequency domain
Discrete Fourier Transform
Butterworth Low Pass Filter
Butterworth High Pass Filter
Image restoration / Noise analysis

BAE 501 Advanced Power Systems & Power Transmission Networks (3pt)

Subject Objective	The subject introduces the basic methods used in the analysis and design of electric power networks.
Learning outcome	Its purpose is to give students a working knowledge of modern power system theory and practice. Techniques introduced in earlier circuit analysis subjects are further developed and applied to power system problems.
Credit Point	3
Hours	72
Assessment	Assignment/ Test/ Online MCQ Test/Online simulated practicals

Contents

Principle of Power System

Source of energy
Steam power station
Hydro power station
Diesel power station
Nuclear power station
Gas turbine power station
Variable load on power station
Interconnected grid system
Economic of power generation
Importance of high load factor
Tariffs
PF improvement
Supply system
Mechanical design of OH line
Corona
Sag
Electrical design of OH line
Performance of transmission line
Line generalised constants
UG cable
Capacitance in 3 core cable
Distribution system
DC Distribution
DC System
AC Distribution
Voltage control
Introduction to switch gear
Circuit breaker
Fuse
Relays

Protection transformers
Substation

Advanced Power System –Power Transmission Network

Consequence of power quality
Power quality & applications
Power quality analysis
Power quality monitoring
Management, control and automation of power quality improvement

Electrical generation and distribution system and power quality disturbances

Integration of hybrid distribution units in power grid
Optimal location and control of multi hybrid model based wind shunt facts to enhance power quality
Power quality and voltage sags indices in electrical power systems.

Power Transmission Line

AASR Conductors
ARC Fault
Circuit breaker rating
Current transformer
Electrical bushing
Electrical fuse
Induction motor model
IP rating
Load factor
Load redundancy
Over current protection
Partial discharge
Per unit system
Phase conversion
Resonance
RL Switching
Sequence network
Short circuit calculation
Symmetrical component
Transformer impedance

Power Transmission Line 2

AC Power Transmission
Insulation Resistance test
Dry type transformer
Electrical software

Insulation resistance test

Electrical Power Generation System

Designing for high temperature and pressure
Turbine components
Burning of fuel
Facts about fuel
Burning gas and oil
Selecting fuel
Water treatment
Heat exchanger
Computer control
System economics

Power System

Transmission & distribution system
Control of power and frequency
Control of voltage and reactive power
Load flow
Faults
System stability
Over voltage and insulation requirement
Substations and protection

Electrical Power

Power line
Neutral earthing
Switch gear
Instrument
Protection
Power system
Generator response to system faults
Calculation of fault current
Symmetrical components
Commissioning electrical plant

Power System Technology

Power system fundamental
Modern power system
Power control devices
Operational control system
Power conversion
Specialised testing & measurement devices

Generation , Transmission and Distribution of Electric Power

Voltage transient and line surge
Transmission of electrical energy
Corona
UG Cable
Voltage drop in distribution
Regulation
Line and machine chart
Voltage regulation stability
Fault calculation in line

Electrical Power Distribution in Industry & Transmission (Electrical Distribution Engineering)

Planning & design
Electrical design
Mechanical design (Over head)
Mechanical design (Under ground)
Metering
Conductor inductance & capacitance

Power Transmission and Practical Power Distribution

Electric power system
Percentage and per unit quantities
Circuit constants
Assemblies of power system components
Power circuit stability

BAE 502 Linear System (1 pt)

Subject Objective	This subject presents the theoretical basis for system analysis and gives students skills in using the techniques to design components of linear control systems..
Learning outcome	To do the design and implementation of part of a control/communication system To apply their knowledge to a real-life problem. Topics include signal types and their representation in the time and frequency domains; modelling systems with differential or difference equations and transforms of the equations; signal operations and processing; the relationship between discrete and continuous quantities and the mathematical techniques applicable to each; the effects of feedback; time and frequency domain performance of systems; system stability; and control design techniques and simple communication systems. Through learning activities students also gain study skills, including academic literacy skills, and an appreciation of the different fields of practice of engineering and the interdisciplinary nature of engineering.
Credit Point	1
Hours	24
Assessment	Assignment/ Test/ Online MCQ Test

Contents

Controllability of linear control system
Finite dimensional linear control system
Linear partial differential equations
Introduction to intelligent control system with high degrees of autonomy
Overview of field

Control system

System identification
Digital and analog
System metrics
System modelling
Classical control
Transform
Transfer functions
Sampled data system
System delays
Poles and zeros
Modern control
State space equation
Linear system solution

BAE 503 Control System (4 pt)

Subject Objective	The objective of this subject is to enable students to model with validation control systems and to analyse, design and implement both analog and digital controllers so that the controlled systems conform with given specifications
Learning outcome	Emphasis is placed on laboratory work, the theoretical content of the subject being only that required to produce successful designs. To work on reduced scale models of actual industrial processes. The equipment is based upon experience gained with authentic control applications and is suitably modified for student use. To follow the usual sequence adopted in industry, i start with the calibration of transducers and actuators leading on to dynamic response testing, physical modelling, model verification and finally to controller design, implementation and testing.
Credit Point	4
Hours	96
Assessment	Assignment/ Test/ Online MCQ Test/ Programmable Control Program software applications
	Topics include linear and nonlinear modelling of control systems using Newton's rules, analogous networks or Lagrangian techniques; linearisation and development of linear, time-invariant transfer functions; development of lead-lag compensators or PID controllers using classical control design techniques such as root locus, Bode gain and phase diagrams, Nyquist plots and Nichols chart; development of state-variable equations from differential equations; development of state-variable feedback controllers and state observers; open-loop pulse transfer functions and discrete-time state models; discretisation using backward difference, bilinear, step-invariance or pole-zero mapping; development of digital PID controllers, deadbeat controllers and discrete-time state-variable feedback controllers; describing functions and limit cycles for nonlinear control systems; and the development of linear controllers for nonlinear systems using describing function techniques.

Contents

Gain
Block diagram
Feedback control loop
Bode plot
Nichol chart
Stability
Stability
Routh Hurwitz Criterion, Root Locus

Nyquist Criterion
State Space Stability
Controllers & Compensators
Controllability & Observability
System Specifications
Controllers, Compensators
Z - Transform

Non Linear Control Applications

Application of input/ output linearization
Non linear control for 2 stages PF correction converter
Non linear observer based control allocation

Control Engineering MATLAB

Transfer functions and their responses
Frequency response/ Plotting
Closed loop control
Controller design

Feedback and Control System

Introduction to linearized dynamic model
Transfer function model of physical systems
Transient performance / S- Plane
Feedback system modelling / Performance
Dynamic compensation of feedback system

PID Control

Application of PID controllers in motor drive system

Applications of Non Linear Control

Introduction
Phase plane method

Process Control

Analog Signal Conditioning
Digital Signal Conditioning
Final Control
Discrete State Control
Controller Principle

Analog Controller
Digital Controller
Control Loop Characteristics

Numerical Control

Introduction to numerical control machinery
Numerical control system
Programming co-ordinates
Two axis programming
Three axis programming
Maths for numerical control programming

BAE 504 Power System Analysis (1 pt)

Subject Objective	The primary objective of this subject is the development of a working knowledge of power systems analysis and design.
Learning outcome	Emphasis is placed on the derivation of equivalent circuits, mathematical models of devices and the system, and on methods of analysis and measurement. Material covered includes electricity supply chain building blocks, system analysis, real/reactive power and load flow analysis, dynamic and transient stability.
Credit Point	1
Hours	24
Assessment	Assignment/ Test/ Online MCQ Test

Contents

Overview
Real & Reactive power injected bus
Classification of buses
Classification of buses
Preparation of data for load flow
Load flow by Gauss Seidel method
Updating load bus voltage
Updating PV bus voltage
Convergence of the algorithm
Solution of a set of non linear equation by Newton Raphson method
Load flow by Newton Raphson method
Load flow algorithm
Formation of Jacobian matrix
Formation of Jacobian matrix
Solution of Newton Raphson load flow
Load flow results
Load flow results
Load flow programs in MATHLAB
Forming Y bus matrix
Gauss Seidel Load Flow
Solving non linear equation using Newton Raphson method
Newton Raphson load flow

Power System Analysis

Transformer
Transmission line model
Gauss Seidel Algorithm
Newton Raphson Iteration
DC Power Flow Algorithm
Modelling
Transient Stability

Power System Analysis

Power Apps Transient Stability validiation document for single pole open/ close simulation
(Power flow analysis + FAULT ANALYSIS + Power system dynamics and Stability)

Static Analysis
Introduction
Network model
Active & reactive power flow
Nodal formation of power flow problem
Basic power flow problem
Solution of power flow problems
Fault analysis
Power system dynamics and stability
Synchronous machine model
The swing equation
Power swing in simple system
Oscillation in multi machine system
Voltage stability
Control of reactive power voltage

BAE 505 Power System Optimization (1 pt)

Subject Objective	The primary objective of this subject is the development of a working knowledge of optimal power systems operation.
Learning outcome	The subject aims to provide students with a knowledge and understanding of elements of the supply chain and how they function in the National Electricity Market; demand-side management options including smart meters; load forecasting and optimal load scheduling for secure energy supply and use; protection schemes for transmission and distribution networks; communications in power systems, including communication media, architectures, automation, standards, protocols and security; and basic design, connection and standards of current and voltage instrument transformers for protection and metering applications.
Credit Point	1
Hours	24
Assessment	Assignment/ Test/ Online MCQ Test

Contents

Introduction
Power Flow Analysis
Classic Economic Dispatch
Linear programming method
Mathematical model of economic dispatch
Linear programming model
Optimization of power system performance using facts devices
Optimization of dynamical system

Matrix Eigen Value Method

BAE 506 Power System Stability & Protection (2 pt)

Subject Objective	The primary objective of this subject is the development of a working knowledge of power systems operation and protection. The subject aims to provide students with a knowledge and
Learning outcome	To provide the understanding of elements of the supply chain and how they function in transmission and distribution networks; communications in power systems, basic design, connection and standards of current and voltage instrument transformers for protection and metering applications.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test/ Simulated Online Practical

Contents

Transient in RL circuit
Symmetrical fault
Transient in RL circuit
DC Source
AC Source
Faults in AC Circuit
Short circuit in unloaded synchronous generator
Symmetrical faults in power system
Calculation of fault current using Z bus matrix
Circuit breaker selection
Symmetrical components & representation of faulted network
Overview
Overview
Real & reactive power
Real & reactive power
Orthogonal Transformation
Sequence circuit for star load
Sequence circuit for delta load
Sequence circuit for synchronous generator
Sequence circuit for symmetrical transmission line
Sequence circuit for transformer
Star/ Star Connected Transformer
Delta/Delta Connected Transformer
Star/ Delta Connected Transformer
Sequence Network
Un- symmetrical Faults
Introduction
Single line to ground fault
Line to line fault
Two lines to ground fault
Fault current computation using sequence network

Transient Stability
Introduction
Power angle relationship
Swing equation
Equal area criterion
Equal area criterion
Multi machine stability
Oscillation in " S " Two areas System
Compensation of power transmission
Introduction
Ideal shunt compensator
Improving voltage profile
Improving power angle characteristics
Improving stability margin
Improving damping power oscillations
Ideal series compensator
Impact of series compensator for voltage profile
Improving power angle characteristics
Improving power angle characteristics
Alternate mode to voltage injection
Alternate mode to voltage injection
Comparison of two modes of operation
Power flow control and power swing damping

Power System Protection

Different types of relays and settings

- Technical feasibility of various options
- Cost of options
- Type of transmission AC/DC
- Number of circuits
- Conductor type
- Transmission loss
- Reactive power support requirements
- Reliability
- Quality of power supply
- Stability aspects of the interconnected system
- Operational planning
- Short circuit levels and breaker requirements
- over voltages and control
- Insulation coordination at substations
- Substation arrangements at the end of line, including switching arrangements.

- Insulation requirements.
- Protection, monitoring, control and automation requirements
- Study of harmonics where needed [as in case of HVDC or when a terminating station is close to sources of harmonics]
- Basic and Detailed engineering related to transmission towers, routes, substations

Philosophy of protective relaying
Fundamental of relaying
Current/ voltage/directional/ differential relay
Distance relaying
Pilot wire relay
Carrier current relay
Voltage transformer
Relay response
Generator protection
Transformer protection
Busbar protection
Line protection
Line protection with distance relay
Line protection with pilot relay

Power system stability

Power system stability Guidelines
Power system stability guidelines for determination and report
Direct stability analysis of electric power system using energy functions
Power system stability –New opportunity for control
Typical power quality and harmonic measurement plots
Robust power system stabilizer design using particle swarm optimisation techniques
Harmonic analysis

Power Quality

Power quality
Electrical protection for power system
Substation automation
Introduction to power quality
Harmonic model of transformer
Substation automation
Modelling analysis of synchronous machines
Life time reduction
Power system modelling under non sinusoidal condition
Impact of power quality on reliability
Role of filters in power system

BAE 507 Electro-mechanical Energy Conversion (2 pt)

Subject Objective	The objectives of this subject are to enable students to: acquire an understanding of the nature of power semiconductor devices and their control and use in switch-mode;
Learning outcome	To understand the arrangement and topology of the circuits in which switch-mode devices are used; appreciate the use of power electronic circuits in high-power applications such as motor drives; be aware of the electromagnetic interference problems associated with power electronic systems; use commercial software for the rigorous circuit analysis of real power electronic systems; analysis and design circuits to meet specific specifications; and fabricate basic power electronic circuits such as a chopper.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test/ Simulated online practical

Contents

Basic semiconductor physics
PN Junction semiconductor
Power switching devices
Electrical rating of switching devices
Cooling
Load/ switch communication
Driving semiconductor & thyristor
Protecting diode / Thyristor/ Transistors
Switching circuit energy recovery
Series , parallel devices operation protection
Naturally commutating converter
AC Voltage Regulator
DC choppers
Power inverters
Switched mode & resonant DC-DC power supplies
Capacitors
Soft magnetic materials
Resistors

Motor Control Electronics

AC Induction motor control
Motor control MCU
Networking for motor control system
DC motor control design
Motor control electronic devices
Power semi conductors

Mechatronics/ Robotics

Robotics Application
Robotic Gears
Interfacing
Robotic Sensors
Communication

BAE 508 Industrial Engineering & Industrial Management (1 pt)

Subject Objective	To work effectively in industry as middle level managers
Learning outcome	To acquire the introductory skills in business information system, engineering management, supervision, quality control, manufacturing management , human resources management, budgeting, operation and managerial decision making.
Credit Point	1
Hours	24
Assessment	Assignment/ Test/ Online MCQ Test

Contents

Effective management decision making

Introduction

Business Information System

Defining Information System

Acquiring Information System

Developing Information System

Managing Human Resources in 21 Century

Human resources Management

Management Basics

The Manager's Job

Planning in Organization

Operation Management

Operation Strategy

Work System Design

Project Management

Inventory Management

Quality Management

Leadership in Quality Management

Strategic Quality Management

Implementing Quality Management

Strategic Financial Management

Finance An Overview

Capital Budgeting

Equity Valuation & Cost of Capital

Strategic Management

The Basic of Strategy

The Levels of formulation of strategy

External analysis

Internal analysis

Strategy implementation

Understanding organization part 1

Organization structure

Organization culture

Managing behaviour

Effective leadership

Part (2) Competency Units

Mgt 501 Basic Management & Communication Skills (1 pt)

Textbook – Mgt 501 Management Basics

Chapter (1) Management basics

Chapter (3) Planning

Chapter (5) Organizing

Chapter (6) Organizing the organization

Chapter (7) Leading

Textbook—Mgt501 Management Briefs

Chapter (2) Leadership

Chapter (5) Motivation

BAE 601 Computer Programming (3 pt)

Subject Objective	This subject provides basic skills in Java/ C/C++/C# programming and software design,
Learning outcome	To acquire the skill practice in object-oriented (OO) programming concepts, data flow, control flow, arrays, and the basics of sorting and searching algorithms. To illustrate a design process using a set of design notations and design rules, and shows how to develop a correct, readable and reusable solution from a problem specification.
Credit Point	3
Hours	72
Assessment	Assignment/ Test/ Online MCQ Test/ Programming software application

Contents

Part (1) Overview Knowledge of the subject

Select any of the following textbooks

- C Programming
- C++ Programming
- C# Programming
- Object Oriented Programming
- C Programming in Linux

IT 401 Object Oriented Programming (1 pt)

IT 402 Structured Programming (1 pt)

IT 403 Visual Basic Programming (1 pt)

BAE 602 Computer Network (1 pt)

Subject Objective	The objectives of this subject are to introduce students to the basic concepts and terminology used in telecommunication networks and a system-level view of network operation.
Learning outcome	To understand the evolution of telecommunication networks; services and applications (voice, video, data, location-based services, multimedia, gaming, etc.); network protocols (TCP/IP, OSI); transmission and switching basics; transmission media; access networks; PSTN; internet (dial up, broadband, ISP); network security; mobile networks (2G, 2.5G, 3G, 4G); data networks (LANs, wireless LANs, WANs, SANs, PANs, enterprise networks); VoIP networks; and convergence in telecommunication networks, next generation networks (NGN) and digital identity in networks.
Credit Point	1
Hours	24
Assessment	Assignment/ Test/ Online MCQ Test

Contents

Computer Network
Peer to peer networking
Client server networking
Network hardware
Network cable
Hub
Wired network
Wireless network card
Firewall
Wiring the network
Wiring the network
Running the network program
Viewing network connection
Network set up on additional computers
Viewing network connection

Introduction
Network model
Data and signals
Data and signals
Data rate limit
Performance
Digital transmission
Digital transmission
Analog transmission
Analog transmission

- Bandwidth utilization/ Multiplexing/ Spreading
- Bandwidth utilization/ Multiplexing/ Spreading
- Transmission media
- Error detection & correction
- Error detection and correction

Defining needs
Area covered
Organization information requirement
System VS Procedure
Types of systems
What are the systems?
Infrasturcture
Support system
Data mart
Organizational structure
Planning for system development
System design
Security of information system
Risk management

BAE 603 Software Engineering (2 pt)

Subject Objective	This subject introduces students to the fundamentals of contemporary software engineering.
Learning outcome	To overview of the agile and non-agile software engineering principles, methods, tools and techniques is presented. Current trends and challenges in the practice of software engineering are explored. To apply contemporary agile requirements analysis, planning, architecture, design, implementation and testing practices to software engineering project work in small teams.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test/ Software Design Practice

Contents

Introduction
Software process
Feasibility study
Project management
Documentation, Requirement analysis
Requirement specification
Business/ Legal aspect
Source code management
Formal specification
Object oriented design 1
Object oriented design 2
Object oriented design 3
System Architecture 1
System Architecture 2
System Architecture 3
Design for utility
Performance of computer system
Coding standard/ Tools for designing 1
Dependable system 1 Reliability
Dependable system 2 Validation
Law aspect
Risks in software engineering
Software engineering as engineering

Nano Technology

What is Nano technology?
Motivation for Nano technology
Scaling laws
Nano technology

BAE 604 Telecommunication Engineering (2 pt)

Subject Objective	On completion of this subject, students have learned the skills to systematically analyse network operations and performance, and also have the ability to appreciate approaches in designing communication and computer networks.
Learning outcome	To understand the communication architecture. To provide the necessary background in understanding operations of TCP/IP, the mostly widely implemented protocol stack in computer networks, on a layer-by-layer basis.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test

Contents

Communication fundamental
Information & bandwidth
Amplitude modulation transmission
Amplitude modulation reception
Single side banded communication
Frequency modulation –Transmission
Frequency modulation –Reception
Communication Techniques
Communication Receivers
Pulse Modulation
Code transmission
ISDN
Transmission lines
Wave propagation
Antenna
Fibre optics

Data Communication

Overview of data communication
Data terminals
Massage and transmission channels
Asynchronous modems and interfaces
Synchronous modem and digital transmission
Protocol and error control

Electronics Telecommunication

RF Transmission
Transmission Lines & Antennas, Video signals

BAE 605 Engineering Management (5 pt)

Subject Objective	To work effectively in industry as middle level managers
Learning outcome	To acquire the advanced skills in business information system, engineering management, supervision, quality control, manufacturing management , human resources management, budgeting, operation and managerial decision making.
Credit Point	5
Hours	120
Assessment	Assignment/ Test/ Online MCQ Test+ Submission of engineering design project (Minor thesis)

Part (1) Overview Knowledge of the subject

Completion of BAE 508 Overview also completes BAE 605 Overview

Part (2) Competency Units

Mgt 502 Operation Management (1 pt)

Mgt 503 Production & Operation Management (1 pt)

Mgt 504 Project Management (1 pt)

Mgt 505 Quality Management and Manufacturing Engineering (1 pt)

Mgt 506 Strategic Financial Management (1 pt)

Mgt 502 Operation Management (1 pt)

Product design and process selection

Total quality management

JIT & Lean System

Capacity planning

Mgt 503 Production & Operation Management (1 pt)

Planning production

Managing inventories-Material requirement planning

Manufacturing

Dealing with technology and design

Operation strategy

Mgt 504 Project Management (1 pt)

Project management

Project organization

Project plan

Progress& performance measurement

Risk management

Documentation/ Audit/ Closure

Mgt 505 Quality Management and Manufacturing Engineering (1 pt)

Background

Why quality management

Standards and models

Progress& performance measurement

Strategic quality management

Documentation/ Audit/ Closure

Mgt 506 Strategic Financial Management (1 pt)

Capital budgeting

Treatment of uncertainty

Debt valuation and cost of capital

Capital gathering & cost of capital

BAE 606 Building Service Electrical & Mechanical Engineering (2 pt)

Subject Objective	To work effectively in M & E Engineer in building construction & building service industry
Learning outcome	To understand the methods of building construction To understand aircondition & refrigeration systems. To design the water supply system for building To design fire protection, building automation systems
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test/ Building service design project.

Contents

Building Construction 1

Making building
Foundations
Wood
Interior finish for wood light frame construction
Wall types
Concrete construction

Air-conditioning & Refrigeration

Controlling the temperature of mass
Electric heat
Humidification
Air-conditioning –Cooling / Comfort
Air-distribution & Balance
Reference Tables

Sanitation & Water Supply

Design of onsite sanitation system
Hydraulic design of sewers

Building Electrical & Mechanical System Part 1

Climate comfort and design strategies
Thermal control

Designing for heating cooling
Large building HVAC system
Water and basic design
Water supply
Water and waste
Fire protection
Fire protection
Illumination
Lighting design
Signal system

Airconditioning and Refrigeration

Theory of heat
Solar heat
Humidification
Air-conditioning-Cooling
Air-distribution & Balance
Air-conditioning Calculation worksheets

BAE 607 Radio Wave Propagation & Microwave Techniques (2 pt)

Subject Objective	This subject presents the theoretical basis for system analysis and gives students skills in using the techniques to design components of communication systems.
Learning outcome	io understand radio & microwave signal types and their representation in the time and frequency domains; modelling systems with differential or difference equations and transforms of the equations; design of antenna, propagation principle
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test

Contents

Radio Wave Propagation

Introduction to radio wave propagation
Propagation features/ Overviews
Electromagnetic waves, Prpagation through atmosphere
Antenna
Radio wave propagation fundamentals
Antennas and propagation
Mobile radio propagation
Propagation
Wave propagation
Radio navigation
Wireless communication

Microwave Technique

Microwave antenna and radio wave propagation
Distributed element circuit analysis techniques
Matching networks
Couplers, combiners, dividers
Mixers
Gain and stability
Noise
Electromagnetism and RF Propagation
Antenna Fundamental
Communication system
RF Safety

Rain attenuation of microwave and milli-meter wave signals

Design of microwave filters (Vol 1)

Mechanically & magnetically tunable microwave filters
Design of microwave filters (Vol 1)
General applications of filter structure in microwave engineering
Properties of some common microwave filter elements

BAE 608 Professional Engineer Competency Demonstration Report

- The students will have to write Engineering Competency Demonstration Report based on their academic study and work experiences gained after completion of academic study.
- Competency Demonstration Report is voluntarily to be submitted. It prepares the students to have the necessary skills to gain the membership of Engineers Australia later.
- The outlines of Competency Demonstration Report will be provided to the students after completion of the last course work subject.

Bachelor of Engineering (Civil)

Year (3) Part 1 ADVANCED GENERAL CIVIL ENGINEERING DEGREE LEVEL

Subjects
BAE 401 Advanced Engineering Mathematics
BAE 402 Calculus
BAE 403 Engineering Mechanics
BAE 404 Engineering Materials & Thermodynamics
BAE 508 Industrial Engineering & Industrial Management
Renewable Energy Subjects **View** http://www.highlightcomputer.com/BEElectricalNew.pdf for the Professional Diploma in Engineering Combined with Renewable Energy Subjects **View** http://www.highlightcomputer.com/re.pdf for detailed contents
BAE 401 Advanced Engineering Mathematics--- **Please see under Bachelor of Engineering (Electrical) Program**
BAE 402 Calculus **Please see under Bachelor of Engineering (Electrical) Program**
BAE 403 Engineering Mechanics **Please see under Bachelor of Engineering (Electrical) Program**
BAE 404 Engineering Materials & Thermodynamics **Please see under Bachelor of Engineering (Electrical) Program**
BAE 508 Industrial Engineering & Industrial Management **Please see under Bachelor of Engineering (Electrical) Program**

BAE421 Building Construction Engineering

Subject Objective	To understand the methods of design, construct, maintain, inspect and manage private and public work projects To understand the effects of environments on the properties and performance of construction materials
Learning outcome	To have a basic understanding of construction materials, in relation to their production, properties, testing and application. The main objectives of this subject are to help students acquire fundamental knowledge of the production, physical and engineering properties of construction materials; To understand the construction techniques, methods, schedules & application of construction materials in building construction. To be familiarize with rules, regulations and industrial standards related to building construction.
Credit Point	4
Hours	96
Assessment	Assignment/ Test/ Online MCQ Test/ Building Design Practice Online simulation

Contents

- Basic skills
- Isomatric drawing
- Retaining walls & Post footings
- Stair
- Doors & Windows
- Trusses
- Buildings
- Collar truss
- Howe truss

- Timber
- Steel
- Brick masonry
- Timber
- Brick-nogging
- Steel
- Reinforced concrete
- Floor plans
- Foundation plan
- Cross section
- Front elevation
- Back elevation
- Left side elevation
- Right elevation
- Culverts
- Bridges
- Buildings
- Pipe culvert
- Box culvert
- Slab culvert
- Deck and girder bridge
- Half top plan of culvert
- Half bottom plan of culvert
- Cross section of culvert
- Longitudinal section of culvert

- Elevation of culvert
- Mix Design
- Permissible water cement ratio

BAE422 Estimating (2 pt)

Subject Objective	To understand the methods of costing, material requirement planning in building construction
Learning outcome	To perform the costing, estimating, rate analysis, to interpret the construction drawings & determine the bills and quantities of construction materials.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test

Contents

- Preliminary estimates
- Detailed estimating
    - Culverts
    - Bridges
    - Buildings
    - Roads
- Analysis of rates
- Detailed Estimating
- Buildings
- Up to plinth level
- Above plinth level
- Culverts
- Bridges
- Roads
- Earthworks

- Analysis of Rates
- Total workdone
- Material and labour requirements
- Estimated cost
- Actual PAE or CCE or RFT
- Complete items
- Quantity
- Measurements
- Content calculation
- Rates
- Buildings
- Above plinth level
- Culverts
- Analysis of rates

BAE423 Fluid Mechanics (2 pt)

Subject Objective	This subject aims to enable students to: understand key concepts and fundamental principles, together with the assumptions made in their development, pertaining to fluid behaviour, both in static and flowing conditions; deal effectively with practical engineering situations, including the analysis and design of engineering systems and devices involving fluids and flow; appreciate possible applications and links to other disciplines; and engage in further specialised study or research..
Learning outcome	The subject also aims to enhance interests in fluid phenomena and applications. Topics include: fluid properties and statics; conservation laws of mass, momentum and energy; flow in pipes; external flow (lift and drag); boundary layers; flow measurements; and environmental fluid mechanics
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test

Contents

- *Methods of Application of water*
- *Water Logging, Drainage, land reclamation and irrigation management*
- *Theoretical Concepts of Boundary Layer, Surface Roughness, Velocity Distribution*
- *Gradually varied flow*
- **Scale Model in Hydraulic Engineering**
- Surface irrigation methods
- Subsurface irrigation methods
- Sprinkler irrigation
- Drip or trickle irrigation
- Flooding Methods
- *Wild or uncontrolled Flooding*
- *Controlled Flooding*
- *Flooding from field channels*
- *Border strip methods*

- *Check method*
- *Basin method*
- *Zig-zag method*
- Furrow Method
- Contour Farming

BAE424 Reinforced Concrete (2 pt)

Subject Objective	To have knowledge of structural design, including the behaviour and design of reinforced concrete (RC) and, to a lesser extent, of prestressed concrete (PSC) elements as parts of overall structures.
Learning outcome	This subject builds on the knowledge of statics, solid mechanics and structural analysis of indeterminate structures that the students have learnt in the previous structural strand subjects. Students learn about the behaviour and design of RC beams, slabs and columns and PSC beams, for both serviceability and strength. Initially, the students are introduced to the Limit State Design philosophy of Australian Standards for structural design and to the material properties of concrete, reinforcement and prestressing steel used for design. RC topics include uncracked section analysis of beams, cracked section analysis of beams (linear-elastic, Desayi-Krishnan, ultimate) for strength and design for strength to AS3600, serviceability design of beams, ductility of singly and doubly reinforced sections, design for shear, T-beams, approximate analysis and design of one-way, two-way slabs and flat slabs/plates, columns (interaction diagrams and slenderness effects), pad footings, cantilever retaining walls and reinforcement detailing. PSC beam topics include history, uncracked section analysis, equivalent loads, load-balancing, cracked section analysis (linear-elastic and ultimate), design for bending, shear, transfer, anchorage.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test

Contents

- Design of Concrete Structures
- FUNDAMENTALS OF FLEXURAL BOND
- Source of bond strength
- Bond Stress Based on Simple Cracked Section Analysis
- Actual Distribution of Flexural Bond Stress
- Development Length
- Factors influencing Development Length
- ACI CODE PROVISION FOR DEVELOPMENT OF TENSION REINFORCEMENT
- ANCHORAGE OF TENSION BARS BY HOOKS
- Development Length and Modification Factors for Hooked Bars

- ANCHORAGE REQUIREMENTS FOR WEB REINFORCEMENT
- Special Requirements near the Point of Zero Moment
- Structural Integrity Provisions

BAE425+525 Timber Engineering (2 pt)

Subject Objective	To have knowledge of structural design, including the behaviour and design of timber structures in construction engineering.
Learning outcome	This subject builds on the knowledge of statics, solid mechanics and structural analysis of indeterminate structures that the students have learnt in the previous structural strand subjects. Students learn about the behaviour and design of timber beams, slabs and columns for both serviceability and strength. Initially, the students are introduced to the Limit State Design philosophy of Australian Standards for structural design and to the material properties of timber and seasoning the timbers used for design.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test

Contents

- Bending Stress and Deflection of Wood Joists
- Shearing Stress Caused by Stationary Concentrated Load
- Shearing Stress Caused by Moving Concentrated Load
- Strength of Deep Wooden Beams
- Design of a Wood-Plywood Beam
- Determining the Capacity of a Solid Column
- Design of a Solid Wooden Column
- Investigation of a Spaced Column
- Compression on an Oblique Plane
- Design of a Notched Joint
- Allowable Lateral Load on Nails
- Capacity of Lag Screws

- Design of a Bolted splice

- Investigation of a Timber-Connector Joint

BAE521 Road & Bridge (2 pt)

Subject Objective	To have knowledge of structural design, including the behaviour and design of road & bridge structures in construction engineering.
Learning outcome	This subject builds on the knowledge of statics, solid mechanics and structural analysis of indeterminate structures that the students have learnt in the previous structural strand subjects. Students learn about the behaviour and design of road, bridge, slabs and columns in bridge for both serviceability and strength. Initially, the students are introduced to the Limit State Design philosophy of Australian Standards for structural d.esign and to the material properties of road & bridge construction
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test

Contents

- Hydraulic Design of Bridge
- The establishment of afflux levels
- Back water levels
- Long Contraction
- Yarnell's empirical equation
- The limiting values of σ
- Skewed bridges
- Discharge computation
- Scour depth under the bridge
- Scour around bridge piers
- Scour protection works around bridge piers
- Road bridge

BAE522 Rock Mechanics (2 pt)

+

BAE523 Soil Mechanics (2 pt)

Subject Objective	The aim of this subject is to develop students' technical competence in the analysis of soil masses and of structures associated with the soil. The analysis of footings, retaining walls and soil slopes are examples.
Learning outcome	By completing this subject, students should be able to understand the concept of failure in soil and apply it to the analysis of soil masses; critically appraise a problem in order to decide which particular analysis should be used; identify the limitations of their analyses and carry out appropriate solution validation; be responsible for the analysis component of a design team; study the relevant literature and learn to apply new or more complex methods of analysis; and carry out fieldwork in association with subsurface investigations. Topics include introduction to geotechnical design – criteria, codes, engineering judgment; site investigation – planning, fieldwork, techniques; shallow foundations – types, bearing capacity theories, retaining structures; earth pressure theories – Rankine and Coulomb, analysis of gravity walls, cantilever walls, braced excavations; deep foundations – types, load-carrying capacity, settlement, group behaviour, lateral loading; slope stability – failure mechanisms, infinite slopes, rotational failure, remedial measures; and soil improvement – compaction, soil stabilisation, dewatering, preloading.
Credit Point	4
Hours	96
Assessment	Assignment/ Test/ Online MCQ Test/ Design Project

Contents

- Soil
- Soil Mechanics
- Geotechnical Engineering

- Subsoil Exploration
- Testing (In-situ Tests & Laboratory Tests)
- SPT, CPT, Vane Shear Test
- Moisture content
- Index Properties Tests (LL, PL, SL)
- Grain Size Distribution Test (Sieve Analysis& Hydrometer)
- Specific Gravity
- Shear Strength Tests (Tri-axial Compression:, Direct Shear, Unconfined Compression:)
- Compaction test, CBR Test
- Consolidation Test, Permeability Test

BAE 523A Environmental Engineering

Subject Objective	Increasingly biological principles are being integrated as part of engineered systems to create innovative and effective design solutions. This subject teaches fundamental chemical, physical and biological principles which can be used to analyse data and formulate design solutions to environmental problems particularly related to water quality.
Learning outcome	To understand hydrology, soils, ecosystems, material balances, nutrient cycles, risk and water quality engineering. The way this knowledge is utilised by engineers for ecosystem restoration and engineered treatment systems is examined.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test

Contents

- Distribution of water
- Requirement for good distribution system
- METHOD OF DISTRIBUTION
- Gravity System
- Combined gravity and pumping system
- Pumping system
- PRESSURE IN DISTRIBUTION MAINS
- SYSTEM OF WATER SUPPLY
- CONTINUOUS SYSTEM
- INTERMITTENT SYSTEM
- DRAWBACKS OF INTERMITTENT SYSTEM
- DISTRIBUTION RESERVOIR
- CAPACITY OF DISTRIBUTION RESERVOIR
- **Mac Donald's equation**
- DETERMINATION OF STORAGE CAPACITY

- Hydrograph method
- Mass curve method
- HEAD LOSS DUE TO FRICTION
- Darcy Weisbach formula
- Hazen William formula
- Manning’s formula
- Combined Darcy Weisbach and Colebrook White formula
- LAYOUT OF DISTRIBUTION SYSTEM
- Dead end system or Tree system
- Grid iron system or Reticular system
- Circular system or ring system
- Radial system
- ANALYSIS OF PRESSURE IN DISTRIBUTION SYSTEM
- Equivalent pipe method
- Hardy cross method

BAE621 Structural Engineering (3 pt)

Subject Objective	This subject covers methods and concepts which are fundamental to the analysis of linear elastic structural frameworks.
Learning outcome	Students learn how load bearing structures respond to the actions of directly applied loads as well as environmental effects such as temperature and foundation settlements. Topics covered include: computing deformations in plane frames using the principle of virtual work; the analysis of statically indeterminate structures using both, the force method as well as the method of moment distribution; and how to establish influence lines and how to use them in finding maximum load effects. A brief introduction to non-linear analysis of structures is also given.
Credit Point	3
Hours	72 hr
Assessment	Assignment/ Test/ Online MCQ Test/ Structural Design

Contents

- DESIGN OF A SLAB BRIDGE
- FOUNDATION SETTLEMENTS
- Major problems with soil settlement analysis
- Settlement classification
- Immediate settlement& consolidation settlement
- Stresses in soil mass
- Approximate method (2:1 slope)
- Boussinesq's method
- Westergaard's method

BAE623 Surveying & Traffic Engineering (2 pt)

Subject Objective	Surveying The objectives of this subject are to enable students to: become competent in the theory and practice of basic surveying skills. Traffic Engineering To understand the transportation planning principles & methods
Learning outcome	Surveying To be able to use basic surveying equipment such as levels and theodolites and perform the calculations and reductions of observations associated with such equipment; be aware of the likely errors that may occur during observations and of methods to eliminate or minimise such errors; be competent in making distance measurements accurately over short distances using tapes and wires and be aware of the advantages of modern developments in this field such as Electronic Distance-measuring Equipment; be able to perform a simple traverse and associated calculations to find the misclose and proportional accuracy, and the bearing and distance of one missing line; understand and be able to perform relevant calculations for the engineering applications of surveying (horizontal curves, vertical curves, and areas and volumes); and be aware of field techniques used to enable preparation of a detail and contour plan. The stadia method is discussed in class and is used as a data-gathering tool in a practical exercise. The applications of modern computer programs to reduce data for and the plotting of detail and contour plans are introduced. Services of professional surveyors are explained, as are engineering situations where surveyors must be engaged. Traffic Engineering To applt the transportation planning principles & methods in land transport & airport runway designs.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test

Contents

Surveying

Topics include: use of equipment such as levels, theodolites and tapes and wires; calculations related to this equipment, as well as traversing, horizontal curve setting out,

design of vertical curves, areas and volumes and stadia and contouring; modern developments in surveying; and the role of the professional surveyor.

Traffic Engineering

- Airport Runway Orientation
- Wind Rose Diagram
- Highway Pavement Performance
- Traffic
- Roadbed Soils (Sub grade Material)
- Materials of Construction
- Environment
- Drainage
- Reliability
- Transportation Engineering
- Transportation Planning
- Urban Transportation Planning
- Urban Transportation Planning Process
- Coding and Zoning
- Inventory Studies
- Travel Studies
- Forecasts for the Horizontal Year
- Trip General Analysis
- Trip Distribution Analysis
- Modal Split Analysis
- Network Assignment Analysis
- Evaluation

BAE624 Water Supply , Sanitation & Finishing (2 pt)

Subject Objective	This subject provides civil and environmental engineering students with a detailed knowledge of: (i) water pollution control objectives, (ii) the design of potable water and sewage treatment processes, (iii) sewerage and water reticulation systems, (iv) total water cycle management, and (v) the advanced technologies used in the upgrading of water and wastewater treatment plants, desalination and water and biosolids re-use.
Learning outcome	At the completion of this subject, students understand: public health and environmental objectives in water supply and wastewater disposal; the design concepts for drinking water and sewage treatment plants; sewerage systems and water reticulation systems; and new technologies developed to meet the new water quality and water re-use objectives.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test

Contents

- Water Quality
- Dissolved Oxygen
- BOD (Biochemical Oxygen Demand)
- COD (Chemical Oxygen Demand)
- Water Sampling
- Requirements for good Sampling Procedure

BAE622 Architecture (3 pt)

Refer any architecture text book , study & prepare the report on practical application problem given by the tutor.

Professional Diploma/ Bachelor of Engineering (Mechanical)

Year (3)

GENERAL APPLIED ENGINEERING (MECHANICAL) DEGREE

Subjects
BAE 401 Advanced Engineering Mathematics
BAE 402 Calculus
BAE 403 Engineering Mechanics
BAE 404 Engineering Materials & Thermodynamics
BAE 507 Electro-mechanical Energy Conversion
BAE 508 Industrial Engineering & Industrial Management

The detailed contents of the above subjects can be found under Professional Diploma/ Bachelor of Engineering (Electrical)

BAE511 Air-conditioning & Refrigeration

Subject Objective	The Heating, Ventilation, Air Condition and Refrigeration Technology or HVAC/R Program is designed to provide hands-on training on the same equipment used by business and industry. In addition, this program is designed to provide the students with the necessary skills required to become a state licensed independent business owner/contractor or for employment in the industry as a technician in residential, commercial, and/or industrial air conditioning, refrigeration and heating.
Learning outcome	Students will have an opportunity to learn various HVAC/R processes that will provide the basic preparation for entry-level jobs in the field of air conditioning, refrigeration, and heating with the initial focus placed on troubleshooting and service. In addition, they will learn the fundamentals of HVAC/R through hands-on training in (1) Theory of temperature control, (2) Electronics, (3) Design and construction of HVAC equipment, (4) Installation, (5) Maintenance, and (6) Repair. As students advance through the program, related topics of indoor air quality, load calculation, system design, and industry code standards will also be covered.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test/ Design Project

Contents

- Heat transfer by Conduction
- Convection
- Radition
- Thermal Conductivity, *k*
- Boundary and Initial Conditions
- Properties and state
- The System
- Internal energy (U)
- Enthalpy (H)
- Work (W)
- Heat (Q)
- Specific Head Capacity (c)

- Heat Engine
- The characteristic equation of a perfect gas
- Expansion processes
- Adiabatic process
- Isothermal Process

BAE613 Mechanical Instrumentation Process

Subject Objective	This subject aims to extend students' competence in the design of engineered systems and components, as well as familiarising them with modern design approach methodologies.
Learning outcome	While the emphasis is on realistic engineering-team/client/boss interactions, need exploration, project development and delivery, this subject draws heavily on the expertise the students have developed up until this stage of the course. Furthermore, the subject aims to enhance and polish students' capabilities in dealing with human-centric aspects of the design process.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test/ PLC Program Project

Contents

- Problem-solving Methodology
- Matlab Environment
- Initializing Variables
- Data Format
- Printing Matrices
- Useful Commands and Functions
- Fundamental Engineering Computations
- Two-Dimensional Arrays and Matrices
- Variational Method
- Collational Method
- Subdomain Method
- Galerkin’s Method
- Least Square Method

BAE614 Machine Design

Subject Objective	The objectives of this subject are to give students an understanding of the kinematics and dynamics of rigid bodies in general planar motion, which is typically encountered in design and analysis of mechanical systems, and an elementary understanding of the vibration of mechanical systems, in particular the dynamic behaviour of single-degree-of-freedom mechanical systems with various damping and applied forces.
Learning outcome	Students should be able to: model problems in rigid body planar and spatial kinematics and rigid body planar dynamics; understand energy methods in contrast to direct applications of Newton's second law of motion for setting up a model; understand the physics of a problem formulated from a real mechanical system; appreciate the role of vibration in machines and structures in the engineering world; understand the procedures required to evaluate a vibration problem; and analyse the dynamic response of single-degree-of-freedom mechanical systems. The subject also covers the concept of a rigid body, full nomenclature used in kinematics, two-body velocity equations and velocity diagrams of planar motion; two-body acceleration equations and acceleration diagram; three-body velocity equations and acceleration equations including Coriolis acceleration term; angular velocity acceleration equations including three-dimensional problems; F=ma applied to a rigid-body-dynamics, significance of 'centre of mass', the 'moment' relationship (M=Ia, etc.); angular momentum, conservation of angular momentum (general case, centre of mass moving, no 'fixed' point); linear and angular impulse problems; energy methods for general planar motion; elementary principles of vibration theory, free vibration of undamped single-degree-of-freedom system; free decay vibration of damped single-degree-of-freedom system; and the forced vibration of single-degree-of-freedom system.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test
TOPICS	Topics covered include the mechanical design process, graphical presentation of engineering ideas and components, computer-aided design, engineering materials and processes and aspects of engineering knowledge. A prototype design-and-build project is a major component of this subject
Specific Contents	• Balancing , Forces, Cam Profile • Resultant Effects of Engine, V-Engine Mechanism • Arrangement to balance the primary moment (C.W) • FORCES IN ENGINE, Inertia Forces and D'Alembert's Principle

BAE512 Building Service Water Supply System

Subject Objective	This subject provides mechanical engineering students with a detailed knowledge of: (i) building water supply control objectives, (ii) the design of potable water supply processes &piping system mechanical design.
Learning outcome	At the completion of this subject, students understand: public health and environmental objectives in water the design concepts for water supply piping design
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test

Contents

- Pressure loss in pipe
- Pressure loss in pipet by loss coefficient method
- Pressure loss in pipe by Equivalent Length Method
- To find the duct pipe by Equal Friction Method
- To find the duct pipe by Balance Capacity Method
- Design the piping system

BAE311 Plant Engineering (2 pt)

Subject Objective	The objectives of this subject are to: have an understanding of the behaviour of linear (or approximately linear) dynamic systems that are typically encountered in the practice of mechanical engineering; and gain an understanding of how such systems can be controlled, or have their dynamics altered, so as to achieve desired outcomes.
Learning outcome	Topics covered include: • dynamic models: component block diagram, laplace transform, undamped free and forced vibration of SDOF systems, damped free and forced vibration of SDOF systems, resonance and beats, logarithmic decrement, response under the harmonic motion of the base, coupled-tank systems, vibration of 2DOF systems, vibration isolation, vibration absorbers • Matlab and Simulink • dynamic response: system modelling diagrams, poles and zeros, effect of pole locations, first order systems, second order systems, effects of zeros and additional poles, stability • basic properties of feedback: the basic equations of control, control of steady-state error, PID control, pole placement method • the root-locus design method: root-locus of a basic feedback systems, dynamic compensation, examples • control system implementation and introduction to advanced control systems.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test

Contents

- ***Three Degree of freedom***
  (a) Newton's method
  (b) Mechanical Impedance method
  (c) Influence coefficients
  (d) Matrix method

(e) Holzer method
(f) Matrix Iteration method

- **INTRODUCTION TO CONTROL SYSTEM**

- **DIFFERENTIAL EQUATIONS**

- **LINEARIZATION OF A NON-LINEAR FUNCTION**

- **MODELLING OF CONTROL SYSTEMS**

- **FREQUENCY RESPONSE METHODS**

- **Stability**

BAE312 Design Engineering (Manufacturing) (2 pt)

This unit is the same as

BAE621 Structural Engineering (3 pt)

The following contents can be added for manufacturing process

Subject Objective	The objectives of this subject are to: explain and provide examples of manufacturing processes involved in casting, forming machining and joining of materials; identify and describe the manufacturing process by which products are made of different materials: metals, polymers, ceramics and composites; demonstrate improved technical written and graphical communication skills by completion of specified laboratory reports and site visit reports; and demonstrate basic problem-solving skills relating to manufacturing and production.
Learning outcome	Students learn the processes and materials available, as well as a competent and practical approach to evaluating, selecting and recognising the connections between the materials/processes and engineering design
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test

Contents

All contents in structural engineering

PLUS

- The design and manufacturing processing of products in various environments ranging from low volume to high volume and with various levels of capital investment in the manufacturing system.
- The modern concepts of quality management, including Taguchi methods, after looking at process quality control and its origins.
- Modern metrology equipment and methods are treated in a similar manner: modern equipment and methods and their origins.
- The computer systems on manufacturing. Firstly, students gain some experience with manufacturing in a CAD/CAM environment.
- Industrial robots in environments such as fabrication, welding and assembly. Topics such as: CIM, CAPP, JIT, GT, FMS, MRP, Toyota and Kanban are introduced in a project environment

BAE313 Environmental Control (2 pt)

This unit is the same as

BAE 523A Environmental Engineering

BAE314 Mechanical Power Generation (2 pt)

Subject Objective	This subject aims to develop students' fundamental knowledge and understanding of the dynamics of various mechanical power generation systems;
Learning outcome	To provide students with knowledge and skills in vibration testing and data acquisition; facilitate students' in-depth learning of the theory and methods, including modelling, modal analysis, system identification and numerical approaches; familiarise students with techniques and data acquisition system used in vibration testing, measurement, signal processing for determining the dynamic characteristics of a physical system; and enable students to apply the learnt methods to real world applications which include vehicle suspension design, vibration analysis and condition monitoring of rotating machines & application of PLC control system
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test

Contents

Mechanical

Basic vibration theory for the analysis of two or more degrees of freedom multi-body mechanical systems, basic topics on widely-used engineering measurements, data acquisitions, spectrum analysis, signal processing and their applications in vibration control and machine condition monitoring.

PLC

- **PLC Basics**
- **PLC Structure**
- **PLC in Comparison with Other Control Systems**
- **PLC's CPU**
- **PLC's Memory**
- **PLC in Comparison with Other Control Systems**
- **PLC's CPU**
- **PLC's Memory**
- **Programming Devices**
- **Programming Languages**

- **Instruction Set**
- **Typical Combinations of Languages**
- **Basic Symbols**
- **Elementary Logic Circuit**
- **PLC's Functions**
- **Industrial Programming**
- **PLC PRACTICE**
- **Selection of PLC**
- **Types of I/O & Capacity Needed**

- **Control System Basic**
- **Sequence Control**
- **Automatic Control**
- **Terms of Sequence Control**
- **Basic Knowledge on Contacts**

- **INDUSTRIAL MACHINE CONTROLS**

BAE315 Materials Engineering (2 pt)

Subject Objective	Mechanical engineers design, construct, maintain, inspect and manage private and public work projects. The common materials used in construction engineering applications and construction are concrete, steel, timber and masonry. It is essential for mechanicall engineers to have a basic understanding of these construction materials, in relation to their production, properties, testing and application.
Learning outcome	To help students acquire fundamental knowledge of the production, physical and engineering properties of construction materials; understand the effects of environments on the properties and performance of these materials; familiarise themselves with the relevant engineering standards and other specifications and standards, in relation to the requirements and testing methods and interpretation of test results; improve analytical and communication skills by presenting test reports; select material in relation to specified requirements; and develop an awareness of the use of waste materials in construction.
Credit Point	2
Hours	48
Assessment	Assignment/ Test/ Online MCQ Test

Contents

- Load, Stress and Strain, Hook's law ,
- Principal of Superposition
- Tensile Test , Factor of Safety
- Strain Energy, Resilience
- Impact Loads
- Varying Cross-section and Loads
- Strain Energy , Resilience
- Compound Bars
- Temperature Stresses

1. Requirements, variability, selection and standards relating to use of construction materials
2. Steels: production, types, usage, mechanical properties and testing and failure modes

Elective (2 pt)

Subjects
BAE513 Production Technology
BAE611 Maintenance Engineering
BAE612 Engineering Metallurgy

Refer any text book , study & prepare the report on practical application problem given by the tutor.

Professional Diploma/ Bachelor of Engineering (Civil-Building Services)

By mixing the degree level Electrical/ Mechanical & Civil Engineering subjects with Advanced Diploma level Electrical/ Mechanical & Civil subjects relevant to Civil-Building services, the individualized study plan for this professional diploma can be arranged.

Professional Diploma/ Bachelor of Engineering (Mechanical-Mechtronics)

By mixing the degree level Electrical/ Mechanical & Civil Engineering subjects with Advanced Diploma level Electrical/ Mechanical & Civil subjects relevant to Mechanical-Mechatronics, the individualized study plan for this professional diploma can be arranged.

The supporting curriculums from Information Technology & Business Management.

Engineering curriculums are supported by Information Technology & Business Management.

The details of the supporting curriculums are also presented.

Diploma/ Advanced Diploma of Engineering

At the following link, those programs can be viewed

http://www.highlightcomputer.com/detailedcontent.htm

Bachelor of Applied Science (Information Technology)

Year 1+2 Refer Diploma & Advanced Diploma in Information Technology Detailed Contents

Bachelor of Applied Science (Computer Science & Computer Technology)

Year (3)

Unit	Topics	Reference	Points
ICT 301	General Electrical Knowledge	EE101	3
ICT 302	Digital Electronics	EE209/H012	3
ICT 303	Amplifier	EE208/H013	3
ICT 304	Material Science	E081	3
EE204	Physics	E046	3
EE201	Mathematics 1	E050	3
EE202	Mathematics 2	E026	3
EE306	Basic Control	I008	3
BAE605	Management		3
BAE408	Analog & Digital Electronics		3
		TOTAL	30

Year (4)

Unit	Topics	Reference	Points
ICT 401	Advanced Mathematics 1	BAE401	3
ICT 402	Advanced Mathematics 2	BAE402	3
BAE604	Telecommunication System		3
BAE508	Project Management		3
ICT 305	Professional Programming (1) C++		3
ICT 403	Professional Programming (2) Object Oriented		3
ICT 404	Professional Programming (3) Java		3
ICT 405	Professional Practice (1) Network		3
ICT 406	Professional Practice (2) Website		3
ICT 407	Artificial Intelligence		3
		TOTAL	30

Refer Diploma & Advanced Diploma in Electrical Engineering Detailed Contents

ICT 305 Professional Programming (1) C++

- Introduction
- Basic program architecture
- Variables
- Console programs
- Program control
- String
- Arrays
- Object oriented programming
- Classes
- Design of classes
- Methods
- Inheritance
- The class object
- Abstract classes
- Interfaces
- Static members
- More about arrays
- Types
- Enum
- Struct
- Generic types
- Exception handling
- Comments
- Extension methods
- Collection classes
- List Stack
- Linked list
- Dictionary
- Text file
- Binary files
- Object serialization
- Lottery
- Expression

ICT 403 Professional Programming (2) Object Oriented

object-oriented-programming-using-c-sharp

- Introduction to object oriented programming
- Unified Modelling Language (UML)
- Inheritence & Method Overriding

- Object rules & the importance of polymorphism
- Overloading
- Object oriented software analysis and design
- Generic collection & how to serialize them
- C# development tools
- Creating & using exceptions
- Agile programming
- Case studies

ICT 404 Professional Programming (3) Java

object-oriented-programming-using-java

- Introduction to object oriented programming
- Unified Modelling Language (UML)
- Inheritence & Method Overriding
- Object rules & the importance of polymorphism
- Overloading
- Object oriented software analysis and design
- Collection framework
- Java development tools
- Creating & using exception
- Agile programming
- Case study

ICT 405 Professional Practice (1) Network

This competency standard unit covers develop services for network clients for emails, internet access, shared resources and the like. It encompasses safe working practices, installing and configuring Domain Name Server (DNS), email servers, Dynamic Host Configuration Protocol (DHCP), remote access servers, Network Address Translation (NAT), directory services, Authentication Servers and documenting development activities.

Essential knowledge and associated skills

This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing network services.

The extent of the essential knowledge and skills required is given Volume 2 Part 2, Clauses

- **Network infrastructure**

  Evidence shall show an understanding of network infrastructure to an extent indicated by the following aspects:

a. Domain Name Service (DNS) encompassing
   - DNS Server Service
   - Root name server
   - Configuring zones
   a. *Note:* Examples include configuring for dynamic updates and delegating zone for DNS
   - Caching – only server
   - DNS client
   - Testing DNS Server service
   - Manually creating DNS source
   - Managing and monitoring DNS

b. Dynamic Host Configuration Protocol (DHCP)
   - Installation of DHCP Server Service
   - DHCP scopes, superscopes and multicast scopes
   - DHCP – DNS integration
   - Active DirectoryTM
   - Managing and monitoring DHCP

c. Network Infrastructure encompassing
   - Configuring and troubleshooting remote access
   a. *Note:* Examples include remote access policy, configuration of remote access profile, Virtual Private Network (VPN), multi link connection, routing and remote access for DHCP
   - Managing and monitoring remote access
   - Remote access security
   - Note. Examples include authentication protocols, encryption protocols and access policy

d. Network Protocols encompassing
   - Installation, configuration and troubleshooting of network protocols
   a. *Note:* Examples include Transmission Control Protocol / Internet Protocol (TCP/IP), NWLink and network bindings
   - Configure TCP/IP packets
   - Configuring and troubleshooting network protocol security and IP Security (IPSec
   - Managing and monitoring network traffic

e. Internet Naming Services in a network encompassing
   - Installation, configuring and troubleshooting
   - Configuring Internet Naming Services replication
   - Configuring an application networking interface
   - Managing and monitoring Internet Naming Services

f. IP Routing encompassing
   - Installation, configuring and troubleshooting of IP routing protocols
   a. *Note:* This includes updating routing tables, and implementing demand-dial routing
   - Managing and monitoring IP routing
   a. *Note:* This includes border routing, internal routing and IP routing protocols

g. Network Address Translation (NAT) encompassing
   - Installing Internet connection sharing

- Installing NAT
- Configure NAT properties and interfaces

h. Certificate Services encompassing
- Installing and configuring Certificate Authority
- Issuing and revoking certificates
- Removing the Encrypted File System recovery keys

- **Directory services**

Evidence shall show an understanding of directory services to an extent indicated by the following aspects:

a. Installing and configuring directory services encompassing
- Installing forests, trees and domains including automatic domain controller
- Creating sites, subnets, site links and connection objects
- Configuring server objects including site membership and global catalogue designation
- Transferring of operations master roles
- Verification and troubleshooting of directory services installation
- Implementation of and organisational unit structure

b. Domain Name Service (DNS) for directory services encompassing
- Installation and configuration of DNS for directory services

a. *Note:* Examples are integration with existing DNS infrastructure, configuration of zones for dynamic and secure dynamic updates and creation and configuration of DNS records

- Management, monitoring and troubleshooting of DNS

c. Change and Configuration Management encompassing
- Implementing and troubleshooting Group Policy

a. *Note:* Examples are Group Policy Object (GPO), linking to an existing GPO, delegation of administrative control of Group Policy, filtering of Group Policy settings by using security groups and modification of Group Policy prioritisation

- Managing and troubleshooting user environments using Group Policy
- Configuring directory services to support Remote Installation Services (RIS) including configuration of RIS options and security.

d. Components of a directory service infrastructure encompassing
- Management of directory objects

a. *Note:* Examples are moving objects, publishing resources in the directory service infrastructure, location of objects in the directory service infrastructure, creation and management of objects manually and by scripting, access control of objects and delegation of administrative control

- Monitoring, optimisation and troubleshooting of the directory services infrastructure performance and replication
- Backup and restoring directory services infrastructure

a. *Note:* Examples are authoritative and non authoritative restoration of directory services, restoration from systems failure and the seizing of operations master roles

e. Security encompassing
- Applying security policies using Group Policy
- Creating, analysing and security modification by using Security Configuration and Analysis snap-in and the Security Templates snap-in
- Implementation of an audit policy

f. Monitoring and analysing security events

Multi-layer switched networks Evidence shall show an understanding of multi-layer switched networks to an extent indicated by the following aspects:
a) Campus network design encompassing: o core layer o distribution layer o access layer o selection of appropriate devices o defining workgroups b) Managing Redundant Links encompassing: o Spanning Tree Protocol (STP) o Controlling STP in redundant environments o STP in Virtual Local Area Network (VLAN) environments o Configuring redundant routing protocols for a fault-tolerant routing Note. An example is Hot Standby routing protocol (HSRP) c) Fast layer 2 services encompassing: o Fast Ethernet o Trunking o Fast Ether channels

o Gigabit services d) Inter VLAN Routing encompassing: o Hardware vs. Software switching o Overview of fast switching technologies o Elements of a multi-layer switch o Configuring multi-layer switches e) Multicast encompassing: o Multi-cast group management o Configuring multi-cast control at layer 2 o Configuring multi-cast control at layer 3 f) Controlling Access to the Campus Network g) Managing Network Traffic

ICT 406 Professional Practice (2) Website

This unit covers installation, set up, implementation and provision of on-going support of web services. It encompasses working safely, installing and administering server software and databases, server side scripting, configuring access and security and documenting work activities.

Development, implementation and testing HTML pages with at least four of the following features:
Relative and absolute links, images and table formatting Cascaded styles sheets

Forms New browser windows Validation of form data
Development, implementation and testing of server scripting for database access with at least four of the following features:
Form data input response Form data processing Database access Output of database table contents Insertion of table data to database
Installation and administration of key features of Web and Web application servers

	Programming elements
Evidence shall show an understanding of the programming elements to an extent indicated by the following aspects:	
a) Algorithm Design encompassing: o Problem Definition o Steps in Problem-Solving o Modular Design o Top-Down Design o Flow-Charts and Structured Programming o Pseudo-Code o Filtering allowable Data Input	

o Using standard Input & Output methods

o Object-Oriented Design (brief intro.)

o Documentation Rationale

o Acceptable Documentation Method

b) Machine-Code, Assemblers and Compilers

c) Brief History of Languages & Limitations

d) Parameters of different programming languages encompassing:

o Constants and variables

o Data types and declarations

o Logical flow control

o Detecting breaches of structure

o Documentation instruction examples

o Procedures and function calls

o Parameter-passing

o Local and global variables

o Object-oriented methods

o Classes and objects,

o encapsulation and inheritance.

o Visual programming methods

o General-purpose program libraries

e) Data structures encompassing:

o Records

o Arrays

o File Input/output

f) Testing and validation encompassing:

o Sequencing the process

o Inconsistencies detection

Note, An examples is comparing code to documentation, commonly called ―Desk-Checking'.

o Test data selection

o Modular testing & debug

o Problems with using

	Client side programming
Evidence shall show an understanding of client side programming them to an extent indicated by the following aspects:	
a) Client server architecture b) Hyper Text Markup Language (HTML) encompassing: o Forms o Table o Cascading style sheets c) Hyper Text Markup Language (HTML) scripting encompassing: o Exposed object model	

o Events and event handling o Objects methods, properties, events o Window, document, form, and form elements o String object, methods, properties o Form field validation Note: Examples of scripting language are JavaScript and Visual Basic (VB) Script d) Extendable Markup Language (XML) encompassing: o Syntax o Structure (well formed XML) o Schemas o Transformations o Parsing Document Object Model (DOM) and Simple API (SAX) o Scripting to Document Object Model (DOM) e) Extendible Stylesheet Language (XSL) generating HTML from XML f) Wireless thin client programming Note. Examples include Java2 Micro Edition (JEME), Mobile Information Device Profile (MIDP), Windows CE and Palm OS g) Consideration for system architecture h) Configurations and profile overview

	Server scripting
Evidence shall show an understanding of server scripting the to an extent indicated by the following aspects:	

a) Client server architecture

b) Web and Application Servers

c) Server scripting languages e.g. JSP, ASP, PHP, Perl

d) Server script Tags

e) Integrating script with HTML

f) Server script object model

g) Request, Response, Session, Application

h) Using server objects

i) Server components

j) Using components in server scripts

k) Scope of server components e.g. session, page, application

l) Component get / set methods

m) Deploying server components

n) Advanced server scripting concepts

Database access
Evidence shall show an understanding of database access to an extent indicated by the following aspects:
a) Relational Databases encompassing: o Tables, keys, design rules and normalisation o Database management utilities Note. Example include MSSQL, MYSQL and Access b) Structural query language (SQL) queries encompassing: o Select, insert, update and delete processes o Application of conditionals _where‘, _distinct‘ and _like‘ o Create and dropping tables

c) Data Base connectivity components encompassing:

o Drivers, data sources

o Database connectivity component loading

o Query connection and execution

o ResultSets / RecordSets

o Rows, columns, cursors, concurrency, pooling

o Iterating through ResultSets / RecordSets

Note. Example include ODBC, JDBC, ADO

	Web applications and services
Evidence shall show an understanding of web servers to an extent indicated by the following aspects:	
a) Comparison of HTTP servers and platforms	

Note. Examples include IIS and Apache

b) Comparison of Application servers and platforms

Note. Examples include J2EE / tomcat, .NET

c) HTTP Servers encompassing:

o Installation requirements and methods

o Security configuration

o Content publishing and security

d) WEB application technologies encompassing:

o Server installation and deployment

o Security

e) Server scripting technologies encompassing:

o WEB application installation and deployment

o Application server administration

f) Web services overview encompassing:

o WEB services XML, API, RPC

o XML API processing

o XML DOM

o SOAP (simple object access protocol)

o WEB Services Security

ICT 407 Artificial Intelligence

- Paths to artificial intelligent
- Agents and environment
- Framework for agents environment
- Agent oriented programming languages
- Net logo development
- Movement, Behaviour & Decision making
- Terms of movement
- Animated mapping simulation Embodiment
- Reactive versus cognitive agents
- Emergence, Self organization
- Adaptibility evolution
- Communication
- Search behaviour
- Resoning rules and logic
- Knowledge & reasoning using decision trees
- Intelligence
- Design objectives for artificial intelligence
- Computer problem solving ability

Bachelor of Business

Year 1Refer Diploma in Management Detailed Contents

Year 2 Refer Diploma & Advanced Diploma in Information Technology Detailed Contents

YEAR (3)

Bachelor of Business (E-Business & Management)

The learning system will be based on self study. Read the given references study materials and prepare the project work. You need to read the books in English.

The following units common to MBA course are to be studied.

Mgt 301 Electronics Business

Mgt 302 Information Security

Mgt 303 Management Information System

Mgt 304 Electronics Commerce

Mgt 305 Quantitative Methods for Management

Mgt 306 Human Resources Management

Mgt 307 Marketing Management

Mgt 308 Artificial Intelligence

To assess Level 3, you need to write the report of 10 pages each on what you have learnt in the unit.

YEAR (4)

Mgt 401 Management Project

Mgt 402 Electronics Business Project

Mgt 301 Electronics Business

- Project Objective
- Business Capabilities
- Benefits
- Deliverables & Dependencies
- Costs
- Financial Appraisal
- Timescales & Milestones
- Success Criteria
- Risks
- the impacts of electronic commerce
- drivers and inhibitors of electronic commerce from the perspective of the CEOs
- the impacts of Electronic Commerce on the Industry Supply Chain
- Electronic Commerce Maturity Model

Mgt 302 Information Security

	Fundamentals of network security
Evidence shall show an understanding of fundamentals of network security to an extent indicated by the following aspects:	
a) Network Security fundamentals b) Securing Perimeter Routers c) Access Control Lists (ACLs) d) Router Authentication, Authorisation and Accounting (AAA) Security	

e) Intrusion Detection
f) Internet Protocol (IP) Security
g) Virtual Private Network (VPN)
h) Firewalls
i) Translations and Connections
j) Access Control Lists for Firewalls
k) AAA and Firewalls
l) Intrusion
m) Intrusion Detection Systems (IDS)
n) Firewall Failover and System Maintenance
o) Firewall VPN‘s
p) Firewall Device Management

- ❑ Introduction of Computer Networks and Internet :
  - ❖ Overview of the Internet, client/server program, circuit switching, packet switching, physical media, queuing delay and packet loss, TCP/IP Service models, Internet Protocol Stack (Layers)
- ❑ Application Layer :
  - ❖ Service requirements, WWW, HTTP, FTP, Electronic Mail, Domain Name System, Socket programming

- ❑ Transport Layer
  - ❖ Service models, Multiplexing/Demultiplexing, Connection-less transport (UDP), Principles of reliable data transfer, Connection-oriented transport (TCP), TCP congestion control
- ❑ Network Layer :
  - ❖ Routing and forwarding, IP(The Internet Protocol) IPv4, IPv6 ,Routing algorithms, Routing in the Internet, Multicast
- ❑ Link Layer and Local Area Networks :
  - ❖ Link layer services, Error detection and correction, Multiple Access Protocols, Link layer addressing, Ethernet, Hubs and switches, Point-to-Point Protocol
- ❑ understand principles of network security:
  - ❖ cryptography and its *many* uses beyond “confidentiality”
  - ❖ authentication
  - ❖ message integrity
  - ❖ key distribution

- ❖ security in practice:
- ❖ firewalls
- ❖ security in application, transport, network, link layers
- ❖ key distribution
- ❖ security in practice:
- ❖ firewalls
- ❖ security in application, transport, network, link layers

Mgt 303 Management Information System (MIS)

- The role of information system
- Hardware & software in enterprise
- Database management system
- Business Telecommunication system
- Communication network
- Network application
- Contemporary mobile service
- Examples of information systems
- Management of MIS
- Managing the Digital Firm
- Emergence of the Digital Firm
- The business information value chain
- A Business Perspective on Information Systems
- Variation in returns on information technology investment
- Sociotechnical Systems
- New Options for Organizational Design:
- The Digital Firm and the Collaborative Enterprise
- Redesigned workflow for insurance underwriting
- The Challenges of Information Systems: Key Management issues

Mgt 304 Electronics Commerce

- **Types of E-commerce**
- **Understanding E-commerce: Organizing Themes**
- **E-commerce Business Models and Concepts**
- **The Internet and World Wide Web: E-commerce Infrastructure**
- **Building an E-commerce Web Site**

- **Online Security and Payment Systems**
- **Marketing Communications**
- **E-commerce Marketing Concepts**
- **Ethical, Social, and Political Issues in E-commerce**
- **Online Retail and Services**
- **E-commerce Business Models and Concepts**
- **The Internet and World Wide Web: E-commerce Infrastructure**
- **Security and Encryption**
- **E-commerce Payment Systems**
- **E-commerce Marketing Communications**
- **Ethical, Social, and Political Issues in E-commerce**
- **Online Service Industries**
- **Supply Chain Management and Collaborative Commerce**
- **Auctions, Portals, and Communities**
- **Online Content and Media**
- **Social Networks, Auctions, and Portals**
- **Online Content Providers: Digital Media**
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Mgt 305 Quantitative Methods for Management

- Research approach
- Data source
- Qualitative method
- Quantitative Methods
- Experiment research & observation
- Questionaries survey
- Sampling
- Survey analysis
- Statistical analysis
- Writing research report

- Prescriptive Process Models
- Agile Development

Mgt 306 Human Resources Management

- Meeting Present and Emerging Strategic Human Resource Challenges
- **Managing Work Flow and Conducting Job Analysis**
- Understanding Equal Opportunity and the Legal Environment
- Managing Diversity
- Recruiting and Selecting Employees
- Appraising and Managing Performance
- Rewarding Performance
- Managing Compensation

Mgt 307 Marketing Management

- Company (Distributor) background (e.g. brief history, nature of business, etc.)
- Marketing objective(s) on the Chosen product/service
- S.W.O.T Analysis
- Target customers
- Product Positioning in the market
- Describe the current marketing mix:
  - Product
  - Pricing
  - Distribution
  - Marketing Communications (Promotion)

- overall competitive strategy

- planning the details of the marketing mix.

- sales& marketing materials

- understanding of company's competitors

- Marketing Recommendations for improvement

- marketing strategies

Mgt 308 Artificial Intelligence

This is the same as

ICT 407	Artificial Intelligence

Mgt 401 Management Project

Mgt 402 Electronics Business Project

Two reports one for Management for (Mgt 303+Mgt 305+Mgt 306) & another for Electronics Business + Marketing (Mgt 301+Mgt 302+Mgt 304+Mgt 307+Mgt 308) subjects are required to be presented.

Each should contain 4000 to 6000 words of how you pursue the study in Management,, Marketing, Electronics Business subjects should be described.

The project should contain management plans, business plan & performance, task, job procedures IT integration etc of the topics of your choices.

http://www.filefactory.com/file/3dcrz90tirvh/Dip%2BAdv%20Dip%2BB%20Bus%20S%20Course%20Outline.doc