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Vanni Institute of Technology

Academic Catalog

July 1, 2005
Rev: A3



VanniTech Initiative by
International Tamil Technical Professional's Organization
San Jose, California, U.S.A

Revision History

Date	Revision	Changes	Owner
June 26, 2003	A1	Original created	Jey Kumara Surier
May 15, 2004	A2	Academic calendar, Courses, Course descriptions, Grading system	Shantharahavan Thangathurai
July 1, 2005	A3	Academic calendar, courses	Shantharahavan Thangathurai

1 Scope

This document describes the academic programs of VanniTech. It describes the academic curriculum and the courses offered during academic year of 2005 - 2006.

2 Academic Programs

VanniTech offers four Academic programs and they are:

1. Computer Networking and Communications (COM)
2. Database Application Development (DAD)
3. Electronics (ELE)
4. Web based Application Development (WAD)

3 Academic Calendar

VanniTech is a quarter-based institute. A quarter consists of 11 weeks. There will be 2 weeks of break between quarters.

Following table lists time frames of four quarters:

Quarters	Beginning Date	Ending Date
Quarter 1	July 04, 2005	September 16, 2005
Quarter 2	October 03, 2005	December 16, 2005
Quarter 3	January 02, 2005	March 17, 2005
Quarter 4	April 03, 2005	June 16, 2005

4 Course Units

Each course is measured as unit, and it reflects the classroom hours spent for the teaching of the course. For example, a 1-credit course means, that the course will be taught 1 hour every week for 10 weeks. A 4-credit course means, 40 hours of classroom instruction.

5 Grading System

Students will get grades for all the exams. Each grade is associated with point values and a Grade Point Average (GPA) is calculated based on the course's unit and the grade. The GPA serves as an overall measure of a student academic performance. Please refer to Appendix A for more information on calculation of GPA.

Following table indicates the possible grade and the respective point values.

A+	4.0
A	4.0
A-	3.7
B+	3.3
B	3.0
B-	2.7
C+	2.3
C	2.0
C-	1.7
D+	1.3
D	1.0
D-	0.7
F	0

6 Minimum GPA

A student is expected to maintain a minimum GPA of 2.25 at any time. Student who doesn't maintain the minimum GPA can be expelled from the institute.

7 Attendance

Students should maintain at least 90% attendance. If it falls below the requirement student could be expelled from the institute.

8 Grades

Grade for each course is determined by the following:

- Homework
- Quizzes (7)
- Midterm Exams (2)
- Final Exam

Lecturers may also conduct unannounced Quizzes at times.

9 Courses

This section describes the Programs and the courses that would be offered during academic year 2005-2006 for each quarter at the institute.

<i>VanniTech</i> : Year 2005 Courses				
	DAD	WAD	COM	ELB
Q4	English III (1)			
	Field Deployable Project - FDP(4)			
		PALM PDA App (1)		
	Linux Platform Development (4)	Java Programming II (2)	Linux/Unix Admin II (3)	Electronics Troubleshooting (2)
	Database Admin (SQL Server) (3)	Advanced Web Programming (4)	Application Servers (2)	Wireless Application (3)
		C# Programming II (4)	Windows Administration II (4)	Microcontroller Applications II (2)
		Intro to UI (1)	Wide Area Networking (4)	PC Based Automation (3)
Q3	English II (1)			
		Software Engineering (2)	Network and System Administration (2)	Circuit Building Techniques and PCB (1)
		Intro to Database Query(1)	Advanced Networking (4)	Circuit Analysis and Design (4)
	Access Programming (4)	Java Programming I (4)	Linux/Unix Administration I (3)	Automation and PLC (3)
	SQL Server I (3)	Intro to Web Programming (3)	Windows Administration I (4)	Microcontroller Applications I (4)
		C# Programming I (4)		Electronics Signals and Systems (1)
		Projects, Planning & Presentation (1)		
Q2	Fundamentals of Database (4)		Introduction to Networking (4)	Digital Electronics and Logic Design (4)
		Operating Systems (4)		Fundamentals of Electronics (4)
		Fundamentals of Programming (3)		
		English I (3)		
Q1	Computer Basics (5)			
	Introduction to Computer Communications Technology (1)			
	Introduction to Database Applications Technology (1)			
	Introduction to Electronics Technology (1)			
	Introduction to Web based Applications Technology (1)			
		Pre-English II (3)		
	Pre-English I (3)			

10 Employment Opportunities

VanniTech has carefully selected its courses and would teach the technological courses that can be used and utilized immediately. The students who successfully complete the programs are expected to be employed in the area soon after their graduation.

11 Courses

This section lists the courses for each program. This is not a complete list and some changes are expected. More courses would be added.

The general courses are taken by all the students regardless of the program they are enrolled in.

11.1 General Common Courses

- Computer Basics
- Introduction to Database Applications Technology
- Introduction to Computer Communications Technology
- Introduction to Electronics Technology
- Introduction to Web based Applications Technology
- Fundamentals of Programming
- Pre-English I
- Pre-English II
- English I
- English II
- English III
- Project Planning and Presentation
- Field Deployable Project

11.2 Database Application Development

- Fundamentals of Database
- Operating Systems
- SQL Server I
- C# Programming I
- C# Programming II
- Access Programming
- Introduction to Database Query
- Introduction to UI
- Database Administration (SQL Server II)

- Linux Platform Development

11.3 Web Application Development

- Fundamental of Database
- Operating Systems
- Introduction to Web Programming
- Introduction to Database Query
- Introduction to UI
- Advanced Web Programming
- C# Programming I
- C# Programming II
- Java Programming I
- Java Programming II
- Palm PDA Development

11.4 Computer Communications and Networking

- Introduction to Networking
- Operating Systems
- Advanced Networking
- Windows Administration I
- Windows Administration II
- Linux / Unix Administration I
- Linux / Unix Administration II
- Wide Area Networking
- Application Servers

11.5 Electronics

- Fundamentals of Electronics
- Electronic Signals and Systems
- Digital Electronics and Logic Design
- Microprocessor Systems
- Automation and Programmable Logic Controllers
- Circuit Analysis and Design
- PC Based Automation
- Wireless Applications
- Micro-Controller Applications

12 Course Descriptions

This section describes the each course.

12.1 General Courses

12.1.1 Computer Basics

Prerequisites: None

Credits: 5

Lab: 8 hours per week

Course Description:

This course introduces students to the world of computers. Topics covered include the basic principles of computer technology, current uses and applications of computers, and the latest advancements in computer technology.

Students will learn the basics of computer hardware, software, data management, networks and the internet, web technologies, information system analysis and design, new technologies in computers, and hardware assembling and debugging. Students will also receive hands-on training with the Windows operating system and Microsoft Office. This course builds a solid foundation of computer technology and application concepts necessary for more advanced courses.

At the end of this course students will be able to understand and appreciate computer technology and its applications. In addition, students will be able to assemble computer systems from basic components for a given set of specification requirements.

12.1.2 Introduction to Technology

Prerequisites: None

Credits: 4

Course Description:

The intention of the course is without going too much deep inside theory and technical, giving exposure to what each program involves. This course provides an opportunity for the student to get a taste of each study program without the intimidation of its technological detail. This course introduces all four main programs (Database application development, Web based application development, Electronics & Communications and networking) of VanniTech by outlining various applications of each technology. Then it brings some most fundamental analytical/logical techniques used in these technologies.

12.1.3 Fundamentals of Programming

Prerequisites: Math, GCE O/L, GCE A/L

Credits: 3

Course Description:

This course introduces students to the general principles of programming. These principles are language independent. This course introduces the “C” language to teach programming fundamentals. This is an appropriate first class for a student planning to learn a computer programming language. Upon completion students will be able to understand programming logic, flow charts, pseudo statements and finally convert a pseudo statement into programming language. Upon completion of this course students will fully understand programming fundamentals. Students will be able to design, develop, debug and documents programs using “C”. This course will help the student to move into the next level of programming such as C#, VB etc.

Course Outline:

Binary, hex, Boolean operation (Binary arithmetic, 2’s compliment etc.), Memory, The CPU, Peripherals, Programs, Computer Instructions, Computer Languages, Low-level, High-level, Packaged, Object Orientated, Converting source code into programs, Assemblers, Compilers, Interpreters, RAD Compilers, The constituents of a program, Variables, Constants, Statements, Expressions, Decisions, Flow Statements, Computer Decisions, Flow Charts, Logic Tables, Program Flow, Branches, Loops, Sub-programs, Procedures, Functions, and Methods., Iterations, Breaking a program down into pseudo – statements, Loops, Input / Output (standard, file), File access, Arrays, Testing, Debugging & Maintenance

Lab:

Students will be given exercises to complete throughout the course that test each of the given topics covered.

12.1.4 Operating Systems

Prerequisite: Computer Basics

Credits:

Lab: 8 hours per week

Course Description:

This course provides a detailed understanding of operating systems and includes hands-on training with Microsoft Windows and Linux. Students will learn about the different types of operating systems and their components, as well as programming languages and their run time environments. Topics covered include operating system functions and classifications, commands, file system techniques, I/O and system components, system resources, logging and trouble-shooting, system maintenance, scripts and tasks automation, system programs, computer security and access control, SAN and storage

systems. This course builds a solid foundation of computer technology and application concepts that are necessary for the advanced courses.

12.1.5 Pre-English I

Prerequisite: G.C.E O/L

Credits: 3

Lab: 4 hours per week

Course Description:

This is intended to give basic reading and writing skills to prepare students to follow the technical courses. As the intensive course, it builds the basic foundation in English. The major areas covered in the course: simple sentence formation, basic reading and comprehension and building current usage vocabulary.

Successful students will be able to:

- Read and comprehend the facts in various texts
- Write well organized sentences and paragraphs
- Gain a satisfactory practical knowledge of the required vocabulary

12.1.6 Pre-English II

Prerequisite: G.C.E O/L

Credits: 3

Lab: 4 hours per week

Course Description:

This is intended to give English grammatical structures, listening practices and speaking skills to develop students' communicative skills. This will help them to express themselves and exchange views through English.

Successful students will be able to:

- Converse in English to express their own ideas
- Conduct debates on various topics
- Ask and answer orally questions related to course materials
- Give short presentations in English
- Understand the lectures in English

12.1.7 English I

Prerequisite: G.C.E O/L

Credits: 3

Lab: 8 hours per week

Course Description:

The first level English course is intended to provide a basic foundation in English. Students will learn basic reading and writing skills to prepare them to read and understand instruction material related to computer technology classes. Major areas covered in the course are: basic simple sentence formation, basic reading and comprehension and basic listening and speaking in English.

Successful students will be able to:

- Read and understand technical class related text books
- Write answers to questions on technical course materials
- Ask and answer orally questions related to course materials

12.1.8 English I

Prerequisite: English Level I

Credits: 1

Lab: 4 hours per week

Course Description:

The second level English course is intended to teach intermediate English skills in reading, writing, and speaking. The course focuses on vocabulary building, intermediate reading and comprehension, writing simple paragraphs, learning correct pronunciation, and intermediate conversation.

At completion successful students will be able to:

- Converse in English
- Speak and understand simple sentences about day-to-day life situations
- Talk about their families, food, shopping, work, the environment and their lives in villages/cities
- Write small paragraphs
- Understand English TV and educational programs

At the end of this course students will be able to better understand and use English in educational settings as well as day-to-day life. It also builds sufficient confidence in facing and conversing with English speakers and prepares students to handle advanced technical studies in English.

12.1.9 English III

Prerequisite: English Level II

Credits: 1

Lab: 4 hours per week

Course Description:

The third level English course is intended to teach advanced skills in reading, writing, and speaking. This course focuses on higher level vocabulary building, reading and comprehension, sentence formation, essay writing and elocution.

At completion successful students will be able to:

- Write personal and business letters, resumes and short essays
- Read and understand English newspapers and magazines
- Complete job interviews in English
- Give short presentations and speeches

At the end of the course students will be able to better understand and use English in educational and professional settings. In addition, students should have sufficient confidence to work in English-only job environments and be equipped with the skills to handle advanced technical studies in English.

12.1.10 Project Planning & Presentation

Prerequisite: Passing of first and second quarter English courses and technical background

Credits: 1

Lab: None

Course Description:

The goal of this course is to introduce the students to communicate well in a real life-working environment and project planning and execution.

The course will focus on planning complex projects using tools like Microsoft project, tracking the projects, managing people and deliverables, etc. This course will also include: Effective meeting, Constructive confrontation.

12.1.11 Field Deployable Project (FDP)

Prerequisite: Successful completion of Q1, Q2 and Q3

Credits: 4

Lab: Significant amount of time is expected to be spent in lab.

The Field Deployable Project is the real life application of classroom and lab experience. Students will make use of what they have been learning in the course works. Students from each Program will do a project in their field.

The project is done by a team of students. Each team consists of 3 members. The members can be from the same program or they could come from more than one program. For example, a team can consist of 3 students from COM Program or a student from each DAD, WAD, and COM Program.

The selected project must be technically viable, practically usable and potentially marketable.

FDP based course work is designed to give students practical application of what they learn in classrooms and labs. The project is to be done during Q3 using the knowledge gained in Q1, Q2 and Q3.

At successful completion, students would learn the following:

- Identifying Technological Application/Opportunity
- Writing Feasibility Report
- Writing Proposal
- Writing Specification
- Performing Professional level Software, Hardware or Networking work
- Writing Quality Assurance Test Procedure
- Product Release
- Getting Customer feedback/report
- Presentation of Proposal/Design/Project

The project also trains the students to work in a team environment towards achieving a common goal.

12.2 Database Application Development

12.2.1 Fundamentals of Databases

Prerequisite: None

Credits: 4

Lab: 4 hours per week

Course Description:

This course, using Microsoft Access, introduces fundamental relational database management system (RDBMS) concepts and data normalization principles. Students are provided with a strong foundation in database theory and in the practical applications of databases in the world today.

On successful completion students will be able to apply these new skills to create database tables, queries, forms and reports for viewing, sorting, filtering and analyzing data. Students will also be able to design simple forms for data input and basic reports for data output. In addition, the basics of Access programming will be covered. At the end of the course, students will be able to create basic database applications.

12.2.2 C# Programming I

Prerequisite: Introduction to Programming

Credits: 4

Lab: at least 4 hours per week of lab time

Course Description:

C# is a powerful and versatile, state of the art programming language. In this course students will learn the fundamentals of programming with Microsoft C# and Visual Studio .NET and the .NET framework. During this hands-on course students will learn to create windows applications and also to understand the basics of object oriented programming.

The goal of this course is to introduce students to state of the art technology in the Windows world. Students will learn a language that is versatile and important in the coming .NET revolution - knowledge that will be very relevant in the future.

After successfully completing this course students will be ready to start work as junior programmers developing basic windows applications. This knowledge will open the door to entry level programming work at banks, shops or NGOs. A student who completes this course must go on to complete the C# Programming II course for a well-rounded understanding of programming in the Windows environment.

12.2.3 C# Programming II

Prerequisite: C# Programming I

Credits: 4

Lab: at least 4 hours per week of lab time

Course Description:

In C# Programming I, students learned the basics of programming with C# and applied that knowledge to write a basic Windows application. This course will expand that knowledge and expose students to more complex concepts such as using C# to create web applications and interacting with databases.

The goal of this course is to expand the knowledge of C# and to incorporate interaction between windows applications and databases. Students will also gain knowledge in the basics of building web applications.

Continuing our hands-on approach, this course will enable students to create end-to-end solutions such as database inventory systems for shops, websites for local handicraft merchants to sell their products worldwide and customer information systems for banks. Students should be able to work on any type of re-construction project that requires databases or websites and will be equipped to function as a programmer in any software project in the Windows .NET platform.

12.2.4 Linux Platform Development

Prerequisite: Computer Basics, Operating Systems

Credits: 4

Lab: 8 hours per week

Course Description:

The course focuses on “Open Source” development technologies. The topics are LAMP Overview, PHP Overview, MySQL Overview, Apache server, Tomcat, JDBC, PHP: Development tools, PHP: Add-on tools, Existing PHP applications, Installation of WAMP, PHP fundamentals, MySQL fundamentals, Development and Deployment of MySQL based PHP applications, Session Management, Security in LAMP, Object Oriented programming in PHP, other Scripting languages, Optimising MySQL/PHP applications, Scaling MySQL/PHP solutions.

At the end of the course student will be able to understand and appreciate the new paradigm “Open Source” Technology and well-positioned to become serious and advanced developers of data base and web applications and will fully understand the cost-effective application of open source in general and Linux in particular in serious commercial and other environments. The open source software applications not only runs on Linux but also on other platforms including windows, unix etc. Hence it provides

application portability among different platforms. It also can run on hand-held (PDA) which runs windows CE, without any changes.

12.2.5 SQL Database Administration

Prerequisite: Fundamentals of databases

Credits: 4

Lab: 4 hours per week

Course Description:

This course covers Microsoft SQL server 2000 and data modeling, and builds on the Introduction to Databases course.

Students will learn about entity relationship diagrams, data modeling and other advanced concepts. We also introduce DBMS features and benefits. Using Transact SQL, students will get to know SQL programming, create a sample database, and create, modify and perform suitable queries on the database to view the results. At the end of the course students will be able to create and maintain database applications using SQL server 2000.

12.2.6 Web Application Development

12.2.7 Introduction to Web Programming

Prerequisites: None

Credits: 4

Lab: At least 2 hours per week

Course Description:

This course will introduce students to the fundamentals of web development and serves as a prerequisite for the Advanced Web Programming course. Topics covered include HTML basics, advanced topics such as style sheets, forms and multimedia integration, DHTML (Dynamic HTML) and an introduction to XHTML and XML. On completion, students should be able to publish web pages with special effects, multimedia, styles, and interactive dynamic elements. On completion of each topic, students will be given an assignment that will require them to apply the material learned.

Course Project:

Each student will build a home page which will integrate all of the technologies learned.

12.2.8 Advanced Web Programming

Prerequisites: Introduction to Web Development

Credits: 4

Lab: At least 2 hours per week

Course Description:

In this course, students will be introduced to developing web applications using Microsoft C# and ASP.Net. The course will cover ASP.Net concepts, creating user interfaces, working with web objects (such as the request/response objects and cookies), and hosting with IIS. Following that students will learn how to store and retrieve data with ADO.Net. Security and Error handling topics will also be covered. On completion, students will be able to develop fully functional web applications with client server interactions and database manipulation capabilities. On completion of each topic, students will be given an assignment that will require them to apply the material learned.

12.2.9 Java Programming

Prerequisites: Computer Basics, Introduction to Programming, Introduction to Web Development and Fundamentals of Databases

Credits: 4

Course Description:

Learn the importance, strengths and weaknesses of the Java Programming Language. Use classes, inheritance, polymorphism, interfaces and package protection mechanisms to build Object-Oriented programs in Java. Build user interfaces using Swing. Use layout managers, multithreaded programming and networking in Java. Build client-side applets. Use the JDBC API for database access. Build Web applications using Servlets. Understand how to integrate J2EE technologies, such as XML, JMS EJB and JNDI.

Learn about Java programming language structure and syntax. Review control statements, object-oriented design, and console and file I/O. Learn about Java 2 SDK tools: javac, java, javadoc, and jar. Create sophisticated Java applications that leverage object-oriented features of the Java language, such as inheritance and polymorphism. Use the file I/O class libraries to read and write to and from data and text files. Create and use Java GUI components such as panels, buttons, labels, text fields and text areas. Create stand-alone Java applications, and use the frame and menu classes to add graphics to Java applications. Create Java applets and launch them from a Web browser. Build client server applications using RMI. Use the rich set off java libraries and highlights and some of the newer features in 1.3 and 1.4 such as Collections and Nio. Understand design considerations, best practices, and practical experience.

At the end of this course students will be able to understand critical issues related to the building and deployment of cross-platform web-based client server applications.

Lab:

At the end of each session a homework assignment will be given. Each homework assignment will build on previous labs. At the end of the course students will have built a server based application that provides database access. The server will have clients that may be an applet, html, or a java client.

12.3 Electronics

12.3.1 Fundamentals of Electronics

Prerequisite: A/L Physics, A/L Math

Credits: 4

Course Description:

This course provides a foundation for learning electronics by introducing critical circuit components (from resistors to complex semiconductor devices), their interconnection to form useful circuits, and theory for analyzing basic circuits. Laboratory sessions provide hands-on experience with building several small electronic circuits and analyzing them using oscilloscopes and other test equipment and elementary troubleshooting techniques.

The following major topics will be covered:

- Overview of electronic systems and signals
- Introduction to electronic components, from resistors to microprocessors
- Understanding and drawing circuit diagrams
- Basic theory for circuit analysis
- Analysis of simple electronic circuits, schematics, and theoretical analysis
- Basic troubleshooting techniques

This course provides fundamental knowledge for understanding and working with electronic circuits. It also provides basic knowledge for troubleshooting simple circuits using standard test equipment.

Lab:

- Using Oscilloscopes and other test equipments
- Build and Analyze some simple circuits with pre-made Electronic kits
- Draw complete schematic diagrams using ORCAD, or similar CAD programs

12.3.2 Electronic Signals and Systems

Prerequisite: Fundamentals of Electronics, A/L Physics, A/L Math

Credits: 3

Course Description:

This course explains overall electronics technology as being comprised of electronic systems and various types of signals that are processed by these systems. The course is presented in a top-down format of understanding typical electronic-systems, by providing examples, functionality, signal-flow, and theory of critical electronic building-blocks.

Basic theory and examples of signal processing will also be covered, to complete the big-picture as well as some details for working with electronic systems.

The following major topics will be covered:

- Introduction to various types of Electronic systems, and Signals
- Introduction to Analog, Digital, and Power Electronics
- Critical electronic “building-blocks” and their functions
- Signal flow (input to output) analysis of sample electronic systems
- Basic theory of Signal Processing and Analysis

This course provides fundamental knowledge to understand and work on various types of electronic systems in the field, including system level knowledge for installation, maintenance, and trouble-shooting. In addition, a foundation for self-learning of more complex electronic systems is provided.

12.3.3 Digital Electronics and Logic Design

Prerequisite: Fundamental Electronics

Credits: 4

Course Description:

This course provides sufficient knowledge to understand, design, and troubleshoot basic digital electronic systems. It covers from basics of digital electronics to programming with Programmable Logic Devices (PLD). The Lab sessions provide hands-on experience with building and programming several digital circuits, including PLD circuits, and related troubleshooting techniques, using Logic Analyzer and Oscilloscopes.

The following major topics will be covered:

- Introduction digital systems and Logic families
- Logic Gates and Boolean Algebra
- Combinational Logic circuits
- Sequential Logic circuits
- Design of critical digital building blocks
- Introduction to PLD and programming

This course provides basic knowledge and skills for understanding and troubleshooting typical digital systems in the field. It also provides adequate design skills for building simple digital circuits with PLD for field projects.

Lab:

- Build simple combinational and sequential logic circuits with an electronics learning kit
- Design, build, program and analyze PLD circuits, using a logic development kit
- Troubleshoot circuits with a logic analyzer, logic probe, and oscilloscope

12.3.4 Automation and Programmable Logic Controllers

Prerequisite: Mathematics including Boolean Algebra, Physics at GCE Advanced Level, Computer Basics, Fundamentals of Programming (Assignment of Variables, Loops and nesting).

Credits: 3

Course Description:

Use of PLC in Industries and Utilities.

The goals of this course are:

- Understand that any repetitive process can be automated to achieve maximum benefit
- Prevent human errors in any process
- Protect equipment from damage caused by events preventable e.g. prevention of water pumps starting and running without water due to low level or carelessness
- Understand a process; design control logic both in software and hard-wired format; having a HAZOP study; test and commission. This includes trouble shooting as well.

The Major Sections of this course are:

- Relay Logic, Boolean Logic and PLC Logic
- Ladder diagrams and Programming.
- HAZOP study and Wiring and Drawing Regulations
- Archiving and Documentation
- Fundamentals of Transmitters, Sensors, Transducers, Modems and their inputs and outputs.
- SCADA (Supervisory Control and Data Acquisition)

The Major Topics of this course are:

- Elements of Automation. Simple physical examples of process and their automation. For a specific input the need for a desired output, without any manual intervention, unless a beginning of a process or ending a process,
- Boolean Logic, Relay Logic and PLC Logic. Simple series electrical circuit, parallel circuit and push button start / Stop circuit. Practical circuits work. (Can use batteries and tri color LEDs for construction of circuits). Normally open contact, Normally closed contact, timer contacts etc.
- Use of the PLC and the computer communication. Media of communication – Twisted wire, Radio etc.
- Materials - Materials like data cables, Modems, decoders and encoders, PLC modules. For illustration purposes only.
- Preparation of drawings. Manually first, using any drawing software later.
- Computer awareness and commands used in basic applications like, cut, copy, paste, delete, load etc.

- Documenting the process, drawings etc. and the field requirements, including wiring regulations and naming conventions.
- Data acquisition. (Using telemetry to start a pump in a remote reservoir, when the level is full and stop when it reaches the lower level and use of control valves, with both pneumatic and electric actuators). SCADA systems for use of electricity, water supply and transport systems can form research topics.
- Project work. – This is something, which has to be considered for local requirements. E.g. Loading silos with grain and packing them into bags and reloading into vehicles for distribution, irrigation scheme, controlling the amount of water delivered, Traffic light control and co-ordination of traffic lights along a major road and railway level crossings with boom gates etc. Students can decide on their topic, and the area where this can be implemented, prepare reports, materials required, Bills of quantities and estimates.
- Presentation of the project to the teachers and mates and answering questions. This shall be similar to a HAZOP study and recorded and project revised.

This course will bring the students up to latest technology available now and teach them to be innovative in applying the knowledge to various day to day items.

The knowledge of PLC will form the fundamental of economic revolution. PLC is applicable in any industry or utility small or big. Examples of small utilities are From a boom gate operation, Traffic Control Lights, counters to regularize and to be attended in an orderly manner in banks, hospitals, shops, bus-stations etc. The use can extended to the control of a process like the Cement Plant from a control room with the use of PLCs in a Distributed Control System, or the control of National Power System using SCADA.

Anyone with innovative ideas can make use of PLC in any process. Simple items include a water pump starter, which can be started from a remote place without any bother to check whether the inlet pressure is OK (pipe line is not empty or water level is too low), because the PLC can be programmed for level and pressure control. Mobile Packaging controllers can be designed to bag a fixed size or weight of items. Locally onion or rice packaging can use these and Storage of products under specific environmental conditions etc.

Lab:

One hour lab work per week as part of the course work. The last three months a Field Deployable Project can be undertaken.

12.3.5 Circuit Analysis and Design

Prerequisite: Fundamentals of Electronics, A/L Physics, A/L Math

Credits: 4

Course Description:

This course provides a working knowledge for the analysis and design of critical electronic building blocks described in the Electronic Signals and Systems course. Primary emphasis is on analog circuits and their signal processing. Also included is a section on digital interface techniques for working with standard hybrid systems. The lab section of the course provides hands-on experience with popular computer based simulation tools to assist in circuit analysis and design details.

The following major topics will be covered:

- Introduction to OpAmps and their uses
- Analysis & design of basic, analog electronic building-blocks
- Functional analysis of other critical analog circuits
- Interfaces to digital circuits
- Circuit troubleshooting techniques
- Theory and usage of Computerized circuit simulation tools.
- Design, Analyze, and Build an audio amplifier, with a tone control.
- Troubleshooting techniques, using oscilloscopes, multi-meter, etc.

This course provides knowledge to work at the component / sub-system level of typical electronic systems in the field:

- Provides component / sub-system level knowledge for trouble-shooting circuits
- Provides ability to design, and build small-scale analog circuits for various applications in the field

Course Project:

Students will build an audio amplifier with a tone control.

12.3.6 Wireless Communications

Prerequisite: Fundamentals of Electronics, Electronics Signals & Systems.

Credits: 3

Lab:

- 1) Theory & usage of Wireless Space port modems
- 2) Space port modem configuration for different applications
- 3) Troubleshooting / fault isolating techniques on installed space port modem setups.

Course Description:

This course provides a *analysis & design* of simple Wireless Applications & a *good introductory level understanding* on other wireless implementations. Primary emphasis is on *Concepts & Implementations of simple Wireless Applications*. It also includes sections on Wireless application standards & Introduction to Real world wireless applications too. No laboratory section included in this course at this stage, but students are required to carry out *class assignments/ home work* as part of the course.

This course provides the required knowledge to work at design & implementation level on simple Wireless Applications and to understand the real world applications.

- 1) Provides ability to *design, & construct small-scale / simple* wireless applications in the field.
- 2) Provides system block level knowledge to understand the Wireless Systems.

12.3.7 PC Based Automation

Prerequisite: Fundamentals of Electronics, PLC and Automation, Circuit Analysis and Design

Credits: 3

Lab: Use a multi-function I/O module (Labjack) connected to a PC, for various experiments on signal acquisition, analysis, and controller applications

- a) Monitor and analyze few analog signals (from sensors)
- b) Drive relays based on signal input.
- c) DC motor speed control

Course Description:

This course provides working knowledge to *develop and maintain small scale automation* applications, *using a Personal-Computer* with additional hardware and software components. Primary emphasis is on providing a *broad exposure* to the critical functions relating to *Factory Automation*. The laboratory section of the course provides hands-on experience of using a PC, along with a multi-function hardware module to *implement effective signal monitoring, analysis, and control applications*.

This course will be useful to the students of VanniTech, by providing -

1. Knowledge and skills to install, troubleshoot, and maintain small scale automation systems.
2. Develop cost effective automation solutions for small-scale applications, in various factory environments, such as food processing and packaging industries.

12.3.8 Micro-controllers

Prerequisite: Digital Electronics and Logic Design

Credits: 4

Course Description:

This course provides a working knowledge of embedded systems and programming. A typical micro-controller based embedded system will be analyzed in detail, with regards to its components and system-architecture. Programming of embedded systems using Assembly and C language will also be presented. A laboratory project based on a micro-controller development system will provide hands-on experience for working with embedded systems in the field.

The following major topics will be covered:

- Introduction to micro-controllers
- Introduction to memory devices and peripherals of embedded systems
- System and component analysis of an embedded system
- Interfacing embedded systems
- Programming of embedded systems – using Assembly and C languages
- Debugging techniques

This course provides the knowledge required to work with typical embedded systems in the field. Program pre-built embedded controllers for various applications in the field. Provides knowledge for installing and trouble-shooting embedded systems. Design and build small-scale embedded controllers.

COURSE PROJECT:

Minimum of 3 programming projects using a micro-controller development system.

Lab:

- System identification and timing analysis of a micro-controller development system
- Programming of projects
- Use of logic analyzer for debugging with disassembly techniques

12.4 Computer Communications and Networking

12.4.1 Introduction to Networking

Prerequisite: Basic understanding of bit representation, Algebra
Credits: 4 credits

Course Description:

This course introduces networking concepts and uses the OSI layer model to explain the specific tasks different layers have. The physical, data link, network, transport and application layers will be examined with the TCP/IP protocol as the primary focus.

Introduction to OSI layers:

- Physical layer: coaxial, fiber optic, wireless
- Data Link layer: Ethernet, Frame Relay, Token Ring, ATM
- Network layer: IP addressing, ARP, DHCP
- Routing: OSPF, RIP
- Transport layer: TCP, UDP, QOS, RSVP
- Application layer: FTP, TFTP, telnet, SMTP, HTTP, NFS

This course will be the foundation course to teach Advanced Networking and Wide Area Networking courses. It will provide hands-on exposure to configuring a TCP/IP network. Emphasis will be placed on students being able to understand how data flows through a network.

Lab:

- Configuration of routers
- Setting up ftp servers, telnet clients, smtp mail servers, web servers

12.4.2 Advanced Networking

Prerequisite: Introduction to Networking
Credits: 4 credits

Course Description:

This course focuses on advanced networking topics, including an in-depth understanding of the components of networking hardware and their set up. Network design and troubleshooting will be extensively explored. Students should be able to use the knowledge and hands-on-experience from this course to design, implement, configure and trouble-shoot local area networks.

Topics Covered Include:

- Network Management: SNMP, RMON
- Network Security: Firewalls, virus protection
- Storage Area Networking: Fibre Channel protocol, iSCSI, FCIP
- Networking components: routers, switches, hubs, gateways
- Internetworking: Issues to consider when internetworking with different protocols
- Troubleshooting networks: Failure analysis and avoidance
- Large network design guidelines: Factors to consider in designing large networks

In this course students will learn how to design, install, troubleshoot and maintain Local Area Networks in small offices or campuses. The lab will provide experience with the installation of hardware (switches, routers, hubs, etc.) and software components (firewall, management applications, etc.).

Lab Projects:

- Installation of networking management application to monitor, configure and determine network faults. Perform standard MIB browsing of network entities.
- Installation of firewall and virus protection application to protect networks
- Setting up a simple SAN network involving a SAN switch, host and disk array
- Designing a large scale network; not necessarily implementing it due to hardware availability

12.4.3 Windows Administration I

Prerequisite: Operating Systems, Computer Basics

Credits: 4 credits

Lab: 8 hours per week

Course Description:

This course provides students with the knowledge and skills necessary to install and configure Microsoft Windows 2000 Professional and Server on stand-alone and client computers that are part of a workgroup or domain. In addition, the course covers basic Microsoft networking and infrastructure. The course focuses on the installation and configuration of the Windows 2000 server to create print and terminal servers, data storage and file managements, administration of resources, user management and accounting, adding peripherals and drivers, trouble shooting of devices and drivers, optimization of performance. Basic Network configuration, network monitoring and management, TCP/IP and routing, backup and procedures, security, software maintenance.

This course provides hands-on training on Microsoft Windows 2000 server and starts building skills in systems administration on Microsoft Windows Technologies, to a level where the students can attach, configure, and administer workstation/server in a network environment.

At the end of this course students will be able to understand and appreciate Microsoft Windows Technology and be well positioned to become administrators of any Microsoft Windows system and their applications in commercial and other environments.

Course Project:

Students will build a Microsoft Windows 2000 computer system network using five computers, a switch, a hub, and a printer.

12.4.4 Windows Administration II

Prerequisite: Windows Administration I

Credits: 4 credits

Lab: 8 hours per week

Course Description:

This course provides students with the knowledge and skills necessary to install and configure advanced Microsoft Windows 2000 Professional and Server features in a networked environment. The course focuses in anced network infrastructure, install and configure DNS, DHCP, WINS, and RAS. Network Address Translation, Advanced security, management of resources in network, mail, web and file server configuration and management, Active Directory services.

The course provides hands-on training on advanced Microsoft Windows 2000 concepts and start building skills in administration of server applications in Microsoft Windows 2000 technologies, to a level where the students can configure, and administer server applications in a practical day-to-day network environment.

Course Project:

The student will build a Microsoft windows network, using 5 computers, switch, hub, and printer and establish mail server and active directory services for a small commercial/school environment.

Lab:

At the end of each session project based homework assignment will be given.

Weekly 8hr of lab work is expected.

12.4.5 Linux / UNIX Administration I

Credits: 3 credits

Prerequisite: Operating Systems, Computer Basics

Course Description:

This course focuses on the underlying principles of Unix and Linux in a system-independent way, ensuring that students learn the core concepts, which apply throughout Unix and are present in all versions of Linux, no matter whom the vendor may be (e.g. Red Hat, SuSE, Debian Linux, Mandrake, Sun Solaris and Linux, BSD Unix, FreeBSD, NetBSD, OpenBSD, AIX, HP-UX, Tru64 Unix, OpenUnix, UnixWare, etc.) The course will cover Installation of Linux, startup and shutdown, file organization, data storage and managements, administration of resources, user management and accounting, adding peripherals and drivers, trouble shooting of devices and drivers, Basic Network configuration, advanced networking, TCP/IP and routing, backup and procedures, security, software maintenance, Tamil Linux configuration. HP-UX and Solaris will also be covered as case studies.

The course provides hands-on training on Linux and start building skills in systems administration on Linux/Unix, to a level where the students can attach, configure, and administer workstation/server in a network environment.

Course Project:

The student will build a low cost computer system network using 5 computers, switch, hub, and printer.

Lab:

At the end of each session project based homework assignments will be given. Weekly 6hr of lab work is expected.

12.4.6 Linux / UNIX Administration II

Prerequisite: Linux & Unix Administration I

Credits: 3 credits

Lab: 8 hours per week

Course Description:

The course focuses on advanced concepts of Linux/Unix and their usage as server applications in a network environment. The course will cover advanced networking and configuration (switches & Routers), DNS, BIND, Send mail, setting up DHCP and NIS, advanced security, LILO, RAS, configurations and maintainance of mail server, files server, ftp server, news server, web server (Apache), fire walls, proxy, installation of MYSQL, scripting languages like shell and other popular script languages, automation of

tasks, trouble-shooting networks and systems, NFS client and server, SAN, NAS, RAID, popular open source applications, Lindows, Archiving, advanced Tamil Linux, HP-UX and Solaris exposure.

The course provides hands-on training on advanced Linux/ unix concepts and start building skills in administration of server applications in Linux/Unix, to a level where the students can configure, and administer server applications in a network environment.

Course Project:

The student will build a low cost client server network, using boot server technology, using 5 computers, switch, hub, and printer and establish mail, web, MYSQL, file servers for a small commercial/school environment.

Lab:

At the end of each session project based home work assignments will be given.

Weekly 6hr of lab work is expected.

12.4.7 Wide Area Networking

Prerequisite: Introduction to Networking

Credits: 4 credits

Course Description:

This course exposes students to the concepts of wide area networking. Primary exposure will be in areas which are appropriate to the needs of the wide area networking infrastructure in the region of north-east Sri Lanka. Other topics such as ATM and SAN will also be explored. Students completing this course will be able to design, install and troubleshoot wide area networks such as PSTN, remote-access services and ISDN.

Technologies Covered:

- Remote access: 56k dial up, ADSL
- Circuit switching: PSTN networks
- ISDN: digital PBX's, SS7
- T1/E1 transmission: CSU/DSU
- WAN IP networks: BGP
- ATM: PVC, SVC, quality of service (ABR, VBR, CBR, UBR)
- VPN: L2TP, IPsec
- Voice over IP
- Wireless voice and data: GSM, TDMA, CDMA

Lab activities for this course will include the following:

- Configure and set up CSU/DSU
- Set up an ATM network

Appendix A

Grades and Grade-Point Average

Grade

Following grades offered:

A	Excellent
B	Good
C	Satisfactory
D	Passing
F	Failure
W	Withdrew
I	Incomplete
P	Pass (Pass/Fail option)
NP	Not Pass (Pass/Fail option)

"I" This symbol indicates that a student was doing satisfactory work but, for non-academic reasons beyond his/her control, was unable to meet the full requirements of the course. The requirements for removal of an "I" are left to the respective instructor; however, if an "I" is not satisfactorily removed after one academic terms of residence, the symbol "I" will be changed to the grade "F" by the appropriate official.

Grade-Point Average

What is a grade-point average?

The grade-point average (or GPA) gives a measure of a student's average performance in letter-graded courses.

How do I calculate my Grade-Point Average (GPA)?

You use all courses completed on a letter-grade basis (A+ through F). You do NOT use courses graded P, NP, W, or I. The grade you receive in a course determines how many grade points you receive for that course. For each unit in the course, you earn the grade points as shown in Table 1, below.

Grades	Grade-point values
A+	4.0
A	4.0
A-	3.7
B+	3.3

B	3.0
B-	2.7
C+	2.3
C	2.0
C-	1.7
D+	1.3
D	1.0
D-	0.7
F	0

Therefore, if you earn a B+ in a 4-unit course, you earn 4×3.3 grade points, or 13.2 grade points. If you earn a D in a 5-unit course, you earn 5×1.0 grade points, or 5 grade points.

Calculating your grade-point average requires relating the grade points you have earned in courses to the unit value of those courses. For example, suppose that in a quarter you receive the following grades and units:

	Units	Grade
Course#1	4	B+
Course#2	3	A
Course#3	4	C
Course#4	2	F

The grade points you have earned are calculated as follows:

	Units	Grade	Grade Points per Unit	Grade Points for course
Course#1	4	B+	3.3	13.2
Course#2	3	A	4.0	12.0
Course#3	4	C	2.0	8.0
Course#4	2	P	0.0	0.0

To calculate your GPA, you must divide the total number of grade points earned in your letter-graded courses by the number of letter-graded units you have attempted. Note that Course #4 does not apply to the calculation because you chose P/NP grading.

To calculate your GPA, we extract the following information from Courses 1 through 3:

	Units	Grade	Grade Points per Unit	Grade Points for course
Course#1	4	B+	3.3	13.2
Course#2	3	A	4.0	12.0
Course#3	4	C	2.0	8.0
Course#4	2	P	0.0	0.0
Total	13 (11 letter-graded)			33.2

$$\text{GPA} = \frac{\text{Total Grade points}}{\text{Letter Graded Units}} = \frac{33.2}{11} = 3.01$$

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