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DOEACC CENTRE CALICUT  
COURSE PROSPECTUS

CDS/CA/7.5.1/F 40/R0

Name of the Group	: Embedded System Group
Name of the Course	: PG Diploma in Embedded Wireless & Mobile Applications
Course Code	: ED 800
Starting Date	: 30 <sup>th</sup> August- 2010
Duration	: 26 weeks

### **Preamble**

In today's world, wireless products are everywhere, mobile phones, homes, offices, cars, factories, hospitals and consumer electronics. The inherent value of wireless systems lies in its pervasiveness. They are literally embedded in all electronic products, from consumer electronics to office automation, automotive, medical devices and communications. Mobile communication is one of the fast growing engineering domain of Embedded systems and a lot of technologies have emerged in this area such as GSM, GPRS, CDMA, WCDMA, Zigbee, Bluetooth, RFID etc. They make the products smart and are responsible for differentiating the products in the market.

Their huge numbers and new complexity call for a new design approach, one that emphasizes high-level tools and hardware/software tradeoffs, rather than low-level custom programming and logic design. Today's embedded systems have changed from wired connectivity dominant to wireless connectivity dominant. Further wireless systems have become one of the premier domain areas of embedded system. More and more embedded products and applications are making use of wireless technology.

The Post Graduate Diploma course in Embedded Wireless and Mobile applications is designed to cater to the growing market demand for trained high caliber professionals in Wireless Systems. This course covers the fundamentals of Embedded Programming concepts, Wireless & Mobile Technologies and their applications. It is mapped with the Microcontroller programming to develop applications on Wireless and Mobile Technologies focusing on GSM, GPRS, CDMA, WLL, WLAN, WiFi etc.

### **Objective of the Course:**

*To mould fresh electronics engineers and to retrain working engineers into High Caliber Embedded Wireless Communication System Designers by enhancing their knowledge and skills in various hardware and software design aspects of Embedded Systems, Wireless and Mobile Communications. This course offers a range of topics of immediate relevance to industry and makes the students exactly suitable for industries engaged in Embedded and Wireless System development and applications. This course is also an excellent preparation for those wishing to engage in application research in this rapidly developing area.*

**Outcome of the Course:**

*On completion of the Course, the Participants shall get*

- *Exposure with different Wireless and Mobile Communication Technologies.*
- *Expertise required in designing and developing different wireless applications using Java and J2ME.*
- *Familiarization with usage of different Wireless and Mobile communication Modules/kits such as Wifi (WLAN), GSM/GPRS, Bluetooth, Zigbee, GPS etc.*
- *Exposure to Embedded - Wireless applications.*
- *Familiarization with usage of different Wireless Simulators.*
- *Expertise in various programming languages such as C, C++ and Java.*
- *Hands on experience in Operating system (Linux) internals*

**Course Structure:**

The course contains seven modules. After completing the first six modules, the students have to do a four weeks project using any of the topics studied to get the PG Diploma certificate.

<b>ED 800</b>	<b>Module Name</b>	<b>Weeks</b>
ED 801	Embedded C and 8 bit Microcontrollers	4
ED 802	System Design using ARM Microcontrollers	3
ED 803	Fundamentals of Wireless Communication and Simulation using 'C++'	3
ED 804	Embedded Linux	2
ED 805	Wireless and Mobile Technologies	5
ED 806	Mobile Application Development (Java and J2ME)	5
ED 807	Project Work	4
	<b><i>Fee for ED 800 – Rs 44000 (Service tax extra)</i></b>	26

**Other Contents:**

- a. **Course Fee:** Rs 44,000/- (service tax extra - presently @10.3%)  
**SC/ST candidates** whose total annual family income is less than one lakh can avail concession of 25% of the course fee.
- b. **Eligibility :**
  1. M.E./M.Tech or B.E./B.Tech in Electronics/ Electronics & Communication/ Electrical/ Electrical and Electronics/Instrumentation/ Biomedical /Computer Science/Information technology or MSc in Electronics/ Instrumentation/ Computer Science/Information technology.
  2. The Post Graduate Diploma certificate shall be issued to only those who complete the course successfully and produce original or provisional degree certificate and complete mark list.

3. Candidates who have appeared in the qualifying examination and awaiting results may also apply. Such candidates shall be awarded the PG Diploma certificate only after successful completion of the course as well as on production of the degree or provisional certificate and complete mark list. If a candidate is appearing for the examinations (back papers) after the completion of the PG Diploma course (ED 800) at our institute, he/she shall be eligible only for **Advanced Diploma** against PG Diploma on production of the qualifying degree result.
4. On the date of counseling/admission, he/she must produce the original mark lists up to the last semester/year of examination.
- c. **Number of Seats : 20**  
SC/ST candidates and Persons with disabilities are eligible for seat reservation as per existing rules.
- d. **How to Apply :**  
Students are advised to apply in the prescribed Application Form available with the course brochure/prospectus or downloaded from our website. Filled in application forms along with a Demand Draft towards advance fee of Rs.1000/- *drawn in favour of* Director, DOEACC Centre, Calicut, *Payable at* State Bank of India, NITC Branch, Chathamangalam should be sent to the '**Training Officer, DOEACC Centre Calicut, P. B. No. 5, NIT Campus Post, CALICUT – 673 601, Kerala**'. **The Name of the Course applied for should be super scribed on the top of the cover in which the application form is sent.** Hostel accommodation (if required) can be reserved on payment of Rs.500/- along with the advance fee.
- e. **Selection of candidates :**  
Selection of candidates will be based on their marks in the qualifying examination and the admission test conducted by DOEACC CENTRE subject to eligibility and availability of seats.  
The admission to the course shall be based on the following criteria:
1. Should have passed the eligibility criteria as mentioned above.
  2. All students who have applied for the course will have to take an **online test conducted on 11<sup>th</sup>, 13<sup>th</sup> and 17<sup>th</sup> of August 2010**. Students can attend the exam on any one of these dates according to their convenience.
  3. The admission test shall be of one hour duration with 50 questions. The test will be with Aptitude (20%), Logical reasoning (20%), C Programming (10%) and Basic Electronics (50%) including topics digital, analog, microprocessor, computer organization, signals & systems.
  4. The list of Provisionally Selected Students will be published in our website [www.doeaccalicut.ac.in](http://www.doeaccalicut.ac.in) on 19-08-2010.
  5. **All candidates who are provisionally selected have to pay the full course fee (44000+ Service tax currently @10.3%) or first installment of the course fee (Rs22000 + Service tax currently @10.3%) on or before by DD or direct payment into our account** from any bank where core banking facility is available. If the proof of remitting the fees by selected candidates is not received by, the wait listed students shall be given chance for admission.
  6. The details required for direct payment are as given below.

<b>Current Account No:</b>	<b>:</b>	<b>010401158037</b>
<b>Bank Name</b>	<b>:</b>	<b>SBI, NITC Chathamangalam</b>
<b>Bank Code</b>	<b>:</b>	<b>2207</b>
<b>IFC No</b>	<b>:</b>	<b>SBIN0002207</b>

The depositor should obtain the **UTR Number** from the branch while depositing cash directly into our account. Depositor should also obtain the acknowledgement duly filled up and signed by the staff of the bank through which the amount was deposited. UTR number should be mentioned in all the correspondences to us pertaining to amount.

The following details are to be given by the depositor.

1.	Name of the Depositor
2.	Name of the Student
3.	Date of Payment
4.	Amount Deposited
5.	Name of Bank/branch through which amount deposited
6.	Purpose – Course ID – Advance Fee/Hostel Rent/Installment Fee etc.
7.	Proof of Deposit (photocopy of counterfoil/acknowledgement)
8.	UTR Number

The centre will not be responsible for any mistakes done by either the bank concerned or by the depositor while remitting the amount into our account.

7. **Counseling/Interview/Admission is on 30<sup>th</sup> August 2010.** Admission is subject to satisfying the requirements and availability of seats. Attending the counseling does not guarantee admission.

f. **Online Test:**

**Admission test shall be conducted online on 11<sup>th</sup>, 13<sup>th</sup> and 17<sup>th</sup> of August 2010.**

The admission test shall be of one hour duration with 50 questions. The test shall be with Aptitude (20%), Logical reasoning (20%), C Programming (10%) and Basic Electronics (50%) includes topics on Digital, Analog, Microprocessor, Computer Organization, Signals and Systems. Students can appear for the on-line examination on any of the dates mentioned above according to their convenience. All the eligible students shall receive the user name and password by e-mail at least two days before the exam. Those students who are not getting the user name and password at least two days before the examination may contact the centre.

g. **Counseling/Admission :**

All candidates **provisionally selected** and **paid the fees** will have to be present personally for **counseling and admission on 30<sup>th</sup> August 2010** with all the necessary documents (originals and attested copies). Those who don't bring the necessary documents (originals and attested copies) on **30<sup>th</sup> August 2010** are not eligible for admission and counseling.

The original certificates and mark lists starting from SSLC or equivalent up to the present qualifying degree have to be produced for verification whereas the attested copies should be submitted here. The classes shall commence on **30<sup>th</sup> August 2010**. Those candidates who have paid the fees before counseling and are not selected for the course are eligible for refund of the fees on production of the **original** receipt/counterfoil/chalan as proof of fee payment.

h. **Admission Procedure :**

All Candidates who have been provisionally selected for the course are required to report at the Centre on the prescribed day by 9:30 hrs for **counseling and admission** along with the following documents

1. Attested Copies of Proof of Age (10<sup>th</sup>), Qualifications(MTech/BTech/MSc etc)
2. Original Certificates of the above (Provisional/Degree & Mark list)
3. Two copies of passport size photograph and one stamp size photograph

4. SC/ST Certificate in English/Hindi (if applicable)

5. Income Certificate English/Hindi (if applicable)

The candidates on reaching the Centre are required to meet the Front Office Counselor (FOC). The FOC then directs the candidates to the Course Coordinator. The candidate gets the enrollment form and certificates verified by the Course Coordinator. The selected students will then have to meet the FOC along with the enrollment form, who shall direct the student to the Accounts. The candidates are **required to produce the original receipt/counterfoil/chalan as proof of fee payment** at the accounts and get the fee receipt issued by the concerned authority. A student is thus admitted and can attend the classes.

i. **Discontinuing the Course :**

No fees under any circumstances shall be refunded in the event of a student discontinuing the course.

j. **Course Timings :**

This program is a practical oriented one and hence there shall be more lab than theory classes. The classes and labs are from 9.30 am to 12.45 pm and 1.30 pm to 5.30 pm Monday to Friday. During project work, the timings are from 9.15 am to 5.30 pm. The theory to lab proportion is 30:70.

k. **Location & How to reach:**

DOEACC CENTRE Calicut is located very near to NIT (REC) Campus and is about 22Kms from the Calicut (Kozhikode) city. A number of buses [Buses to NIT via Kunnangalam] are available from "Palayam Bus Stand or KSRTC Bus Stand". Our stop is called "Panthrand" & is one stop before NIT. The bus fare is currently Rs.10.50 from Calicut City to DOEACC Centre. Calicut (Kozhikode) is well connected by Rail, Road and Air from different parts of the country.

l. **Course enquiries :**

Students can enquire about the various courses either on telephone or by personal contact between 9.15 A.M. to 5.15 P.M. (Lunch time 1.00 pm to 1.30 pm).

**Telephone Numbers:**

Office 0495 - 2287266 / 2287268

Director's Office 0495 - 2287123

Training Officer 0495 - 2287266

**ED 800 Course Coordinator** 0495 - 2287178

**Office Fax** 0495 - 2287168

E-mail:

[trng@doeaccalicut.ac.in](mailto:trng@doeaccalicut.ac.in)

Website:

[www.doeaccalicut.ac.in](http://www.doeaccalicut.ac.in)

m. **Important Dates (if applicable) :**

Last date of receiving completed application forms	: 16-08-2010
Admission Test	: 11 <sup>th</sup> , 13 <sup>th</sup> & 17 <sup>th</sup> August 2010
Selection list in website	: 19-08-2010
Payment of first installment fees	: 20 <sup>th</sup> to 27 <sup>th</sup> August 2010
Counseling/Admission Commencement of classes	: 30-08-2010
Payment of second installment fees	: 29-11-2010

n. **Placement :**

We have a placement cell, which provides placement assistance to students who qualify our courses.

The course improves the knowledge and skill of the students as it deals with the latest technologies and tools used in industries. This helps the student in getting a placement by

- a. Campus placement
- b. Placement by companies for whom we send the students bio data and they conduct interviews at their site.
- c. Students themselves attend interview at different companies and the course helps in the interview.

o. **Hostel facilities :**

Hostel accommodation is available for boys and girls on daily or monthly chargeable basis. The hostel fee varies from 450/- to 900/- per month depending on the location of accommodation and facilities. However, students are required to pay the hostel fees for the duration of the course for which they are seeking admission at the time of joining the course.

p. **Canteen facilities :**

The Centre has a canteen functioning at the main campus and food at reasonable rates is available for breakfast, lunch, and dinner.

q. **Lab Facilities :**

We have state-of-the-art lab facility in Embedded systems and Wireless communication which include,

- GSM/GPRS/GPS/Zigbee/Bluetooth/Wifi Modems.
- Java and J2ME development toolkit
- Wireless Simulators expertise in Glomosim, NS2, NS3, etc.
- 8-bit & 16-bit Microcontroller Dev. Systems - Intel 8051, 80C196, MPLAB for PIC 16 & 18 series, Cygnal etc
- 32-bit ARM9 microcontroller Development Systems – ATMEL & CIRRUS LOGIC
- ‘C’ compiler for 8051 (KEIL ‘C’ Development IDE), PIC (CCS), 80C196 (Tasking), ARM Developer Suite (ADS v1.)
- TI DSP Development Systems – ‘C6000, ‘C5400, ‘C5500, ‘C243, ‘C2812, ‘C32, ‘C50 etc.
- AD DSP Development Systems - 2191, 21065, 21061 Sharc DSPs
- Code Composer Studio, Visual DSP
- VxWorks, RTLinux & QNX RTOS, Embedded Linux
- Xilinx ISE FPGA Design Tools, Leonardo Spectrum, Model Sim Simulator
- Matlab, Simulink, TI ‘C6000 target for Matlab, LabView, Wireless LAN
- Universal DATA I/O programmer, PC Based EDA tools (ORCAD)
- Digital Storage & Mixed Signal Oscilloscopes (500, 350, 300, 100 MHz )
- EMI Test Setup, Logic Analyzer, SMD Rework station

r. **Course Contents :**

**ED 801: Embedded C and 8bit Microcontrollers**

**Module Duration:** 20 days

**Objective**

This module is framed to set the required background in ‘C’ Language for the rest of the modules on embedded software. It aims at familiarising the students in programming in ‘C’. This module covers the advanced topics in ‘C’ such as Memory management, Pointers, Data structures which are of high relevance in embedded software are considered in depth. This module makes use KEIL C Compiler along with 8051 microcontrollers.

This module also covers the architecture of the popular 8-bit Microcontrollers such as 8051, and PIC for lower end applications. Microcontrollers with built-in peripheral functions (such as PWMs for Motor Control or UPS, interface for Quadrature Encoders, Frequency measurement, Serial ports, 10-bit 8-channel ADCs, Digital I/Os, EPROM, RAM etc.), and lower power consumption are very popular and have drastically altered the economics of Digital System Design. The low cost, small size and programmability make them suitable for an enormous number of applications in products and systems like fuzzy logic controllers, industrial automation, home appliances etc. 8-bit and 16-bit Microcontrollers are widely used in industrial applications.

This module covers hardware and software design aspects in detail. The embedded system design aspects using 8-bit Microcontrollers are also covered in detail.

**Course Description**

**a) Embedded C**

All relevant aspects of ‘C’ programming under embedded environment are dealt with. It starts with the basics of ‘C’ language and covers the advanced topics in detail.

**Course contents**

‘C’ programming

Storage Classes, Data Types, Controlling program flow, arrays, functions

Memory Management

Pointers, Arrays and pointers

Pointer to functions and advanced topics on pointers

Structures and unions

Data structures

Linked List, Stacks, Queues

Conditional Compilation, Preprocessor directives, File operations, Variable arguments in Functions, Command line arguments, bitwise operations, Typecasting

**b) 8051 Microcontrollers**

- Architecture of 8051 Family of Microcontrollers
- Assembly Language Programming of 8051
- Peripherals of 8051 Family of Microcontrollers
- System Design using 8051 Family of Microcontrollers

- Programming includes Keyboard Interfacing, LCD Interfacing, ADC and DAC, On chip Timers and Serial port
- Mini Project using 8051 Family of Microcontrollers

**Device Platform:** SBC-51 Development Board, Keil ‘C’ Compiler & Windows based Wise-51 Software.

**Programming Language:** ‘C’ and Assembly Language

### c) PIC Microcontrollers

- Architecture of PIC Family of Microcontrollers (18F series)
- Programming of PIC Family of Microcontrollers
- Peripherals of PIC Family of Microcontrollers

**Device Platform:** MPLAB Simulator & 18F452 Dev Board

### Learning Outcome

After successful completion of the module students should be able to:

- Develop advanced programs in Embedded ‘C’
- Understand the architecture of the various types of 8-bit Microcontrollers
- Understand the programming of the various types of 8-bit Microcontrollers
- Understand the hardware interfacing of the peripherals to Microcontrollers
- Select a proper Microcontroller for a particular application
- Design new embedded systems using 8-bit Microcontrollers

### Reading List

1. Let us C by Yashwant Kanetkar
2. Embedded C, Pont, Michael J
3. C Programming by Worthington, Steve
4. C Programming language, Kernighan, Brian W, Ritchie, Dennis M
5. Art of C Programming, JONES, ROBIN, STEWART, IAN
6. C Programming for Embedded systems, Zurell, Kirk
7. C and the 8051 Programming for Multitasking – Schultz, Thomas W
8. 8051 Microcontroller and Embedded Systems – Mazidi, Muhammad Ali, Mazidi, Janice Gillispie
9. Embedded Microcontrollers – Intel Hand Book
10. Programming and Customizing the 8051 microcontroller – Predko, Myke
11. 8051 Microcontroller: Hardware, Software and Interfacing – Stewart, James W, Miao, Kai X
12. C and the 8051: Hardware, Modular Programming and Multitasking Vol i – Schultz, Thomas W
13. 8051 microcontroller: Architecture, Programming & Applications – Ayala, Kenneth J
14. Programming and Customizing PIC Microcontroller – Predko, Myke
15. Design with PIC Microcontrollers – John B Peatman
16. PIC Microcontroller Project Book - Lovine, John

**ED 802: System Design using ARM Microcontrollers****Module Duration:** 15 days**Objective**

The 32-bit Micro-controllers with 'C' language support and multifunction peripherals are being used in most of the medium and high end Embedded applications such as Mobile computing, Motion control, Wireless communication and even in Signal processing etc. The processors provide high end computing power as well as an extensive array of peripherals such as USB, LAN support, UART, Modem support, LCD/Graphics interface, General purpose I/O, I<sup>2</sup>C, CAN etc.

The 32-bit ARM processors are used in high end computation requirements such as Multimedia, Digital Camera and other high end applications. ARM processors are very popular in Industries. This module focuses on the architecture of the 32-bit ARM9 Microcontroller. The assembly language programming as well as 'C' language programming of the controller is also dealt in detail. The ARM Developer Suite with Multi ICE and ARM9 kit from Cirrus Logic is used.

**Course Description**

- Introduction to ARM Family of Microcontrollers
- Architecture of ARM9 Microcontrollers
- Architecture of Cirrus Logic EDB9302/Atmel AT91RM9200 Family of Microcontrollers
- 'C' & Assembly Language Programming of ARM Microcontrollers
- ARM and Thumb Inter-working
- Peripherals of EDB9302/AT91RM9200 ARM9 Microcontrollers
- Mini Project

**Device Platform:** Arm Developer Suite 1.2, Multi ICE and ARM9TDMI boards (EDB9302 & EDB9315 from Cirrus Logic, AT91RM9200 from ATMEL)

**Programming Language:** Assembly Language & 'C'

**Learning Outcome**

After successful completion of the module students should be able to:

- Understand the H/w and S/w issues related to the design of a Microcontroller based system catering to the needs of medium and higher end applications.
- Understand the architecture and programming of the 32-bit ARM Processors

**Reading List**

1. ARM System Developer's Guide - Designing and Optimizing System Software by: Andrew N Sloss, Dominic Symes, Chris Wright; 2004, Elsevier
2. ARM Architecture Reference Manual by: David Seal, 2001 Addison Wesley, ENGLAND
3. ARM System - On - Chip Architecture, Furber, Steve

**ED 803: Fundamentals of Wireless Communication and Simulation using ‘C++’****Module Duration**

- 15 days

**Objective**

This module is framed to set the required background in wireless communication. Being the backbone for all the IT based developments; Wireless communication has seen tremendous growth in the past decade. There are new techniques and protocols emerging from time-to-time to cater the requirements of this rapidly growing area. Modern communications systems and the devices operating with in these systems would not be possible without understanding of fundamental wireless concepts. This module also covers the ‘C++’ programming concepts and practical wireless models implementation in C++.

**Course Description****a) Wireless Communication Systems**

- Data Communication Fundamentals
- Modulation schemes
- Spread spectrum technologies
- Elements of wireless communication systems
- ISM Bands
- Fundamentals of Antennas and MIMO concepts
- Radio propagation models

**b) C++ Programming**

- Introduction to OOP and C++
- Class Internals
- Polymorphism and Inheritance
- Templates
- Typecasting
- File operations
- Exception handling

**Practical Session**

- C++ programming
- Practical Wireless Models simulation.

**Learning Outcome**

After successful completion of the module, the students shall be able to:

- Understand the Fundamentals of Wireless communication that is needed to Wireless Systems.
- Understand different basic and advanced Modulation schemes.
- C++ programming concepts
- How to implement Wireless Models using C++

**Reading List:**

1. Computer Networks; By: Tanenbaum, Andrew S; Pearson Education Pte. Ltd., Delhi, 4<sup>th</sup> Edition
2. Data and Computer Communications; By: Stallings, William; Pearson Education Pte. Ltd., Delhi, 6<sup>th</sup> Edition
3. Wireless Communications – Principles and Practice; by Theodore S Rappaport, Pearson Education Pte. Ltd., Delhi
4. Wireless Communication Technology; By: Blake, Roy; Delmar, New York.
5. Mobile Communications; By: Schiller, Jochen H; Addison Wesley Longman Pte Ltd., Delhi
6. The Complete Reference C++, Herbert Schildt, TMH
7. C++ programming language, Bjarne Stoustrup, Addison-Wesley
8. GNU C++ For Linux, Tom Swan , Prentice Hall India
9. Object\_Oriented programming in C++, Robert Lafore , Galgotia publications
10. Object Oriented Programming with C++, E Balagurusamy, TMH
11. Let Us C++, Yashavant Kanithkar, BPB Publications
12. Teach Yourself C++, Herbert Schildt, TMH
13. Thinking In C++, Bruce Eckel, Prentice Hall
14. C++ Primer Plus, Stephen Prata, Sams edition
15. Effective C++, Scott Meyer, Addison- Wesley

**ED 804: Embedded Linux****Module Duration:** 10 days**Objective**

The objective of the course is to provide understanding of the techniques essential to the design and implementation of embedded systems with embedded operating systems.

**Course Description**

- **Introduction**
  - Linux as Embedded Operating System
  - Comparison of Embedded OS
  - Embedded OS Tools and development
  - Discussion on Embedded OS Applications and products
- **System architecture of a Basic OS**
  - Internals of Linux OS
  - System Calls, Linux Compiler options, Make
  - Process, Multithreading and Synchronization
  - Serial port and Network programming with embedded Linux
  - Interrupt programming and Kernel module programming
  - Device drivers
- **Inter Process Communication**
  - Pipe and FIFOs, Shared memory, Sockets
- **Getting Linux on a device**
  - Linux boot sequence, Building Kernel, Building Boot image
- **Linux porting on ARM**
  - Building root file system, Kernel Compilation for ARM, Porting of Embedded Linux to ATMEL ARM9 kit.
- **Practical Sessions**
  - Embedded Linux Applications

**Learning Outcomes**

After successful completion of the module, the students shall be able to:

- Understand the Embedded operating systems that is needed to run embedded systems
- Understand Embedded Linux and its internals
- Build embedded systems using Embedded Linux operating systems

**Reading List**

1. GNU/LINUX Application Programming, Jones, M Tims
2. Embedded Linux: Hardware, Software, and Interfacing, Hollabaugh, Craig,
3. Building Embedded Linux Systems: Yaghmour, Karim
4. Embedded Software Primer: Simon, David E.
5. Linux Kernel Internals: Beck, Michael At Al
6. UNIX Network Programming : Steven, Richard
7. Linux: The Complete Reference: Petersen, Richard
8. Linux Device Drivers: Rubini, Alessandro, Corbet, Jonathan
9. Linux Kernel Programming: Algorithms and Structures of version 2.4: Beck, Michael At Al
10. Linux Kernel Development: Love, Robert

**ED 805: Wireless and Mobile Technologies****Module Duration**

- 25 days

**Objective**

This session will help students and technical professionals to get Complete and essential overview of mobile and Wireless communications technologies. The main objective of these modules primarily focuses on Wireless Technologies and developing applications. And also to cover fundamentals in programming concept with essential coverage to Networking, Telecommunication & Wireless concepts. It is mapped with the Microcontroller programming to develop applications on Wireless and Mobile Technologies focusing GSM, GPRS, GPS, Zigbee, WiFi etc. Objective of the program will be obtained through practical oriented interactive training. The modules also give hands on training on how to use wireless simulators to test the protocols and scenarios in mobile and wireless environment. The wireless simulation concept leads the students towards the wireless research and development area.

**Course Description****Course Content:****Introduction to Wireless LANs**

- Wireless Network Architecture
- WLAN Protocol Architecture
- Wireless Network simulators
- Routing Concepts in Wireless Networks

**Wireless PANs and Wireless Sensor networks**

- WPAN
- Bluetooth Technologies
- Bluetooth Protocol Architecture
- Introduction to Wireless Sensor Networks
- Over view of Zigbee technologies
- Routing protocols in WSN
- MANET
- UWB

**Introduction to Mobile Technologies**

- Cellular Fundamentals
- GSM Architecture
- GPRS and EDGE networks
- GSM Services
- Handoff Management
- UMTS
- 3G and 4G networks

**WiMax an overview****Mobile Satellite Services**

- Introduction to GPS
- Satellite Phones

**Wireless and Mobile Security concepts**

**Practical Sessions**

- Wifi (802.11b/g)
- GSM/GPRS/GPS Modem
- Zigbee Modem
- Bluetooth Modem
- Wireless and Mobile network Simulators (Glomosim)

**Learning Outcomes**

After successful completion of the module students should be able to:

- Understand wireless and mobile cellular systems concepts.
- Develop wireless solutions for embedded applications.
- Under stand the wireless and mobile cellular communication protocol.

**Reading List:**

1. Wireless Communications – Principles and Practice; by Theodore S Rappaport, Pearson Education Pte. Ltd., Delhi
2. Wireless Communication Technology; By: Blake, Roy; Delmar, New York.
3. Wireless Communications and Networking; By: Stallings, William; Pearson Education Pte. Ltd., Delhi
4. Bluetooth Revealed; By: Miller, Brent A, Bisdikian, Chatschik; Addison Wesley Longman Pte Ltd., Delhi
5. Essential Guide To Wireless Communications Applications: From Cellular Systems To WAP And M - Commerce; By: Dorman, Andy; Addison Wesley Longman Pte Ltd., Delhi
6. Bluetooth Demystified; By Nathan J. Muller, McGraw-Hill TELECOM Publishing company Ltd., New Delhi
7. Mobile And Personal Communications Services And Systems; 1<sup>st</sup> Edition; By: Raj Pandya; PHI, New Delhi
8. Mobile Communications Engineering; Theory And Applications, By: Lee, William C Y; MGH, New York
9. Mobile Communications; By: Schiller, Jochen H; Addison Wesley Longman Pte Ltd., Delhi

In addition, manufacturers Device data sheets / software user manuals, IEEE publications and application notes are to be referred to get practical and application oriented information

**ED 806: Mobile Application Development using J2ME****Module Duration**

- 25 days

**Objective**

The power of Java is everywhere. Maximize the potential knowledge of creating applications for mobile devices and main aim of this course is to develop the basic and advanced skill of Mobile Application development

**Course Description**

The Java 2 Micro Edition (J2ME) provides a programming platform for a wide range of mobile and embedded devices. This course focuses on the Java APIs and tools necessary for developing J2ME applications for mobile computers and telephones. It covers the necessary language features for mobile programming and focuses particularly on the Mobile Information Device Profile (MIDP) used in mobile phone application development

**Theory and Practical****1. Core Java****PART-1**

1. Introduction to Java and OOP's
2. Java Hello World Program
3. Java Comments
4. Java Data and Variables
5. Java Command Line Arguments

**PART-2**

1. Java Arithmetic Operators
2. Java Assignment Operators
3. Java Increment and Decrement Operators
4. Java Relational Operators
5. Java Boolean Operators
6. Java Conditional Operators

**PART-3**

1. Java If-else Statement
2. Java Loops (while, do-while and for loops)
3. Java Arithmetic expressions

**PART-4**

1. Methods
2. Arrays
3. Classes and Objects
4. Interfaces

**PART-5**

1. Catching Exceptions
2. File I/O and Streams
3. Java Thread
4. Multithreading

## **2. J2ME Basics**

1. Introduction to J2ME
2. Profiles (MIDP)
3. CLDC and MIDP
4. MIDlet Life Cycle
5. Build and Compile J2ME App
6. Package java.lang -
7. MIDP UI
8. JDBC
9. RMS: Data Base Programming
10. Network Programming.
  - a. TCP
  - b. UDP

## **3. Advanced J2ME**

1. SMS
2. Audio and Video
3. MMS
4. Java Games
5. MIDP2.0 Security

**Programming Language:** Java and J2ME (CLDC) MIDP 2.0

### **Learning Outcomes**

At the end of the course, Participants should have the following key skills:

- i. Understand the method to develop J2ME Applications
- ii. Understand the J2ME Architecture and Profiles
- iii. Know how to integrate J2ME Client Applications with Server-Side applications.
- iv. Develop, Build and Deploy J2ME solutions with or without IDE's (Netbeans/Eclipse/WTK)
- v. Understand issues relating to software development for resource constrained environments
- vi. Know how to develop secure mobile applications
- vii. Know how to write the J2ME code with secure coding ethics to avoid mobile hacking
- viii. Use industry standard open development tools

### **Reading List**

1. Java2: The Complete Reference, Patrick Naughton and Herbert Schildt, TMH.
2. J2ME James Edward Keogh, Tata McGraw Hill.

**ED 807: Project Work**

**Module Duration**

- 4 Weeks

**Course Description**

The students can select hardware, software or system level projects in the area related to wireless and mobile technology.