

**UNIVERSITY OF NIGERIA, NSUKKA
FACULTY OF VOCATIONAL AND TECHNICAL
EDUCATION**

DEPARTMENT OF COMPUTER & ROBOTICS EDUCATION

**POSTGRADUATE, M.TECH AND PhD TECH
IN COMPUTER & ROBOTICS EDUCATION
DEGREE PROGRAMMES**

**DEPARTMENT OF COMPUTER & ROBOTICS EDUCATION
UNIVERSITY OF NIGERIA, NSUKKA**

POSTGRADUATE DIPLOMA IN TECHNICAL EDUCATION (COMPUTER EDUCATION), M.TECH/ AND PhD DEGREE PROGRAMMES

Philosophy of the Programme

Postgraduate Diploma in Technical Education (Computer Education) is made available to people who are already graduates in related fields or careers but desire to update or upgrade their present occupational skills. The strength of this philosophy suggests that majority of the persons that would be admitted into the PGDTE (Computer Education) programme would be graduates of related fields and may be in related careers. Hence, the programme will upgrade their knowledge and skills to make them better equipped for effective performance in their careers.

The M.Tech and PhD Tech programmes of the Department of Computer & Robotics Education are intended to prepare qualified individuals who can assume leadership positions in government, secondary schools, colleges of Education, polytechnics, universities, industry and commerce. Computer Education has since been introduced at all levels of Education in Nigeria to bring about a computer literate citizenry in Nigeria. To achieve this aim therefore, lecturers and teacher that would bring about this literacy must be well trained in higher degrees in Computer Education.

Objectives of the Programme

The postgraduate programmes of the Department of Computer Education are intended to:

1. equip students with professional competencies that will enable them serve in leadership and teaching positions in secondary schools, government, colleges of education, polytechnics and universities
2. increase the technical knowledge and skills of students so that they can keep abreast of technological developments in their area of specialization
3. develop research skills in students and teach them to apply such skills in the solution of problems in Computer Education.
4. equip students with competencies that will enable them become self-reliant in the society.

Scope

M.Tech and PhD Tech programmes of the Department of Computer & Robotics Education are designed to offer courses in three different areas of Computer Education.

Entry Requirements

PGDTE

A minimum of Bachelors degree or HND passed at distinction or upper credit in Computer Science, Computer Statistics, Information Management, Computer Engineering, Mathematics, Physics and other related areas. Other professionals in management and administration whose detailed academic records are acceptable to senate of the University of Nigeria may be admitted.

Master of Technology Education (M.Tech) (Computer & Robotics Education)

The following categories of candidates may be admitted on application:

- (a) Graduates of the University of Nigeria, Nsukka or of other approved universities who have obtained at least a second class honours degrees or its equivalent in Computer Education. Graduates of related disciplines such as Computer Science, Computer Statistics, Computer Engineering etc who have obtained second class honours degree or its equivalent and who have in addition a Post Graduate Diploma in Technical Education (Computer Education) and passed at Credit level or above.
- (b) Holders of Higher National Diploma who have in addition obtained a Post Graduate Diploma in Technical Education (Computer Education) at Credit level or above.

Doctor of Philosophy (PhD Tech) (Computer & Robotics Education)

Candidates who possess a Masters or Higher Degree in any area of Computer Education from the University of Nigeria or other approved universities may be admitted into the Doctor of Philosophy Programme provided that they obtained a minimum GPA of 4.00 on a 5-point scale or 3.00 on a 4-point scale and that a satisfactory research work formed part of the Masters degree.

MODE OF STUDY

1. The Master of Technology Education (Computer & Robotics Education) degree will be prosecuted through course work and project where course work predominates over research and constitutes not less than two thirds of the credit load.
2. The Doctor of Philosophy degree will be prosecuted through course work and doctoral research thesis.

DURATION OF PROGRAMME AND RESIDENTIAL REQUIREMENTS

The maximum and minimum duration of Postgraduate Programme shall be

(a) Master’s Programme

Full-time:	The minimum duration = Three Semesters The maximum duration = Five Semesters
Part-time	The minimum duration = Six Semesters The maximum duration = Eight Semesters

(b) PhD Programme

Full-time:	The minimum duration = Six Semesters The maximum duration = Ten Semesters
Part-time:	The minimum duration = Eight Semesters The maximum duration = Twelve Semesters

Employment Opportunities

Graduates of these programmes can be employed as teachers , instructors in secondary schools, technical colleges, Colleges of Education, Polytechnics, Monotechnics, Universities or training institutions. Graduates of M.Tech and PhD (Computer Education) programmes can also be self employed in computing fields. They can also take up administrative positions in organizations.

Areas of Specialization

The department of Computer Education offers M.Tech and PhD programmes in various areas of

specialization as specified below: Students may specialize in any of these areas at both Masters and PhD levels.

- Software Development and Applications
- Hardware Maintenance and Management
- Networking and Communication
- Robotics Education

Stress Areas	Stress Code
1. Vocational and Technical Education	0
2. Computer Education	1
3. Software Development and Applications	2
4. Hardware Maintenance and Management	3
5. Networking and Communication	4
6. Robotics Education	5
7. Dissertation/Thesis	9

PGDTE (COMPUTER EDUCATION)

COURSES

First Semester

Course No.	Course Title	Units
VTE 0501	Foundations of Technology Education	2
VTE 0503	Vocational Guidance	2
VTE 0505	Administration of Technology Education	2
VTE 0507	Measurement & Evaluation in Vocational Education	2
VTE 0509	Statistics in Technology Education	2
VTE 0511	Research Methods in Technology Education	2
EDU 0511	Educational Psychology I	2
EDU 0521	Curriculum Theory and Planning	3
		TOTAL 17

Second Semester

CRE 0542	Curriculum Development in Computer Education	2
CRE 0544	Practical Teaching in Computer Education	3
CRE 0546	Methodology in Computer Education	2
CRE 0548	Seminar in Computer Education	2
EDU 0512	Educational Psychology II	2
CRE 0590	Project	4
		TOTAL 17

Option: Two Units of Course work must be taken from the following:

CRE 0530	Computer Programming, Application and Management in Schools II	2
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CRE 0540	Computer Hardware Systems Maintenance	2
CRE 0550	Computer Networking and Protocol	2
CRE 0560	Robotics Programming	2
		TOTAL 19

COURSE DESCRIPTIONS

CRE 0542 Curriculum Development in Computer Education

Major components of curriculum in Computer Education. Sources and factors in curriculum planning, historical trends in curriculum revision and innovation in Computer Education in Nigeria. Steps in curriculum development; Curriculum evaluation – roles procedure, stages and evaluation of instruments in Computer Education. A review of syllabuses of secondary school computer studies subject. (2 units)

CRE 0546 Methodology in Computer Education

Application of principles of the curriculum and course construction with application to classroom situations. Emphasis on methods of teaching (objectives, lesson planning, techniques of teaching and sources of materials), and measurement techniques appropriate for Computer Education. Planning of teaching laboratories and instructional techniques in Computer Education. (2 units)

CRE 0548 Seminar in Computer Education

A consideration, identification and examination of some of the major issues presently facing Nigerian educational authorities regarding the role and nature of Computer Education programme under formal and non-formal settings. Instructional problems of teachers and students problems in choosing careers in Computer Education will be considered. (2 units)

CRE 0530 Computer Programming, Application and Management in Schools

Development and application of Software/Programs using Java Programming Language Structures and Keywords in Java. (2 Units)

CRE 0540 Computer Hardware Maintenance

Definition of computer hardware; basic hardware components of the computer such as keyboard, mouse, systems unit, monitor/VDU/screen, motherboards, CPU, CD-ROM drives, hard disk drives, floppy disk drives, RAM and their types, ROM, IDE cables, casing and their types; Assembling a computer; installing operating systems and other software; major maintenance and computer troubleshooting. (2 units)

CRE 0550 Computer Networking and Protocol

Data Communication Networks; Recognition and description of Internet communication protocols; OSI reference model, network protocols and standards, transmission media, Routing, (2 Units)

CRE 0560 Robotics Programming

Introduction to Programming LEGO MINDSTORMS EV3. Robot math, sequences of commands, Sensors and how they work (Touch sensor, Ultrasonic sensor, Gyro Sensor and Color sensor); Intermediate Concepts of Programming (Progrm Flow model, Wait Until commands, Decision-making structures- Loops, IF/ELSE, Repeated Decisions); Troubleshooting strategies and engineering practices – Problem solving strategies, and Team work. (2 Units)

M.TECH P ROGRAMME**First Semester**

Course No.	Course Title	Units
VTE 501	Theories and administration of Vocational and Technical Education	3
VTE 503	Research Methods in Vocational/Technical Ed.	3
VTE 505	Curriculum Development in Vocational/Technical Ed.	3
VTE 507	ICT in Vocational and Technical Education	3
CRE 521	Advanced Spreadsheet Processing	2
CRE 511	Foundations of Computer Education	2
PGC 601	Research Methodology and Application of ICT in Research	3
		TOTAL 19

Second Semester

Six units of courses must be chosen from options A, B, C, or D according to area of specialization

OPTIONS**A. SOFTWARE DEVELOPMENT AND APPLICATIONS**

CRE 520	Advanced Database design and Implementation	2
CRE 522	Presentation Graphics Applications	2
CRE 524	Media Literacy and Distance Education	2
CRE 526	Instructional Software Development in Computer Education	2

B. HARDWARE MAINTENANCE AND MANAGEMENT

CRE 530	Computer hardware Maintenance and Management	2
CRE 532	Hardware security and Digital Forensics	2
CRE 534	Introductory Laboratory hardware maintenance practices	2
CRE 536	Advanced Computer Architecture/Assembling for Voc. Education	2

C. NETWORKING AND COMMUNICATION TECHNOLOGY

CRE 540	Data Communication and internet Security	2
CRE 542	Wireless communication and Mobile computing	2
CRE 544	Data Mining and Security Issues	2
CRE 546	Data Communication Architecture and Protocols in Tech. Education	2

D. ROBOTICS EDUCATION

CRE 550	Foundations of Robotic Education	2
CRE 552	Introduction to Robotic programming	2
CRE 554	Introduction to Robotic graphics	2
CRE 556	Rudiments of Design and Development of Educational Robots	2

Third Semester

Course No.	Course Title	Units	
CRE 512	Seminar in Computer Education	2	
CRE 590	Dissertation	6	
			TOTAL 16
			Grand Total 35

PhD PROGRAMME

Candidates should register a total of 40 units of courses.

First Semester

Course No.	Title	Units
VTE 601	Emerging issues and innovations in Vocational and Technical Education	3
VTE 603	Enterprise Development in Vocational and Technical Education	3
VTE 605	Proposal and Grant Writing in Vocational and Technical Education	3
PGC 701	Synopsis and Grant Writing	3
		TOTAL 12

Second semester

CRE 610	Doctoral Seminar in Computer Education	4
CRE 612	Curriculum Studies in Computer Education	3
CRE 614	Emerging issues/trends in Computer Education	2
		TOTAL 19

Third and Fourth semesters

Eight (8) units must be chosen from either options A, B or C according to area of specialization

OPTIONS:

A. SOFTWARE DEVELOPMENT AND APPLICATIONS

CRE 621	ICT Multimedia and Instructional Content Development	2
CRE 623	E-learning course Design and Development	2
CRE 625	Web Design and Applications	2
CRE 627	Collaborative Computing and e-learning Technologies	2

B. HARDWARE MAINTENANCE AND MANAGEMENT

CRE 631	Software Applications for Hardware Maintenance	2
CRE 633	Advanced Digital Systems Security and Forensics	2
CRE 635	Cloud computing, storage and media systems	2
CRE 637	Laboratory works in hardware maintenance	2

C. NETWORKING AND COMMUNICATION TECHNOLOGY

CRE 641	Network Protocols Design and Implementation	2
CRE 643	Next Generation Network Technology	2
CRE 645	Advanced Technology Developments in Networking and Communication	2
CRE 647	Practical Networking Designs	2

D. ROBOTICS EDUCATION

CRE 651	Emerging trends in Robotic Education	2
CRE 653	Advanced Robotic Programming	2
CRE 655	Advanced Robotic graphics	2
CRE 657	Design and Development of Educational Robots	2

Fifth Semester

CRE 690 Thesis	12
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TOTAL 41

COURSE DESCRIPTIONS

CRE 511 Foundations of Computer Education

Overview of the concept of Computer Education, Rationale for Computer Education, Computer Education in Nigeria – Pros and Cons, Policies on Computer Education, Theories of Computer Education. (2 units)

CRE 521 Advanced Spreadsheet Processing

Data reduction using Spreadsheet software; Analysis of research data using SPSS – declaration of variables, creation of Data files, comparison of variables. Graphical representation of data. (2 units)

CRE 526 Instructional Software Development

Instructional software development life cycle. Standards for instructional software. Planning a structured instructional software development project. Data structures for instructional software. Employing software project management tools for implementation. Documentation of instructional software product. (2 units)

CRE 536 Advanced Computer Architecture/Assembling

CPU Architecture, Single processing systems, Parallel processing systems: CISC RISC, Pipelining Multithreading, Multicore architecture. Memory architecture, memory hierarchy, Organization and mapping, Cache architecture. System Cloning Techniques. (2 units)

CRE 541 Data Communication Network Architectures and Protocols

Data Communication Components. Network types and components. Local and Wide Area Network architectures. Multipoint, point-to-point protocols. OSI Model and Implementation.

CCITT recommendations. Basics of Packet Switching Systems. Network Security, issues at various OSI levels. (2 units)

CRE 520 Advanced Database design and Implementation

General database theory. Relational Databases, Real-time databases, Distributed databases, Distributed Database Architecture. Online transactions processing (OTRAP). Database concurrency control and global commits. Overview of Mobile Database Caching. Datamining and Online Analytical Processing (OLAP). Educational applications. Structured Query Language. (2 units)

CRE 522 Presentation Graphics Applications

Modeling of graphic objects in 2-D and 3-D Coordinate Space. Implementation of transformation commands for computer animation, using OpenGL or any other graphic presentation software. Making Movies: Concept, Storyboarding, Sound, Character Development, Layout and look, Effects, Animation, and Lighting. Matchmoving and compositing of digital characters. (2 units)

CRE 526 Media Literacy and Distance Education

Concept of Media Literacy, Types of media – Digital and Non digital media, Interactive and non interactive media. Concept of Distance Education, Use of media in Distance Education. (2 units)

CRE 530 Computer Hardware Maintenance and Management

An overview of basic consumer electricity (circuits devices & accessories) Hardware Structures in Microcomputers. System Unit main building blocks. Peripheral interfacing and configuration. BIOS Setup and configuration. System fault diagnosis. Preventive Maintenance. Maintenance workshop management and organisation. Use of Basic tools and measuring instruments. (2 units)

CRE 532 Hardware security and Digital Forensics

The hardware security environment. Hardware access control. Electrical and electromagnetic threats. Information tapping techniques. Personal computer security. Tamper Resistant Seals. Using Open-Source/commercial software tools for digital forensic triage and cross drive analysis. Visualization Techniques for digital media exploitation. Analyzing Hard disk imagery. Forensic investigation of small digital devices and large capacity drives. (2 units)

CRE 534 Introductory Laboratory hardware maintenance practices

Introductory laboratory practical in hardware maintenance. Mainly projects, assignments and applications. (2 units)

CRE 546 Data Communication and internet Security

Overview of Internet security. Tracing Internet traffic, information interception. Security threats on the Internet: Alteration, spoofing and denial of service, Jamming, hacking. Security Appliances and applications: Usability and Main tenability. Security patching and security

software. Emerging threats and solutions. Data encryption and cryptanalysis. (2 units)

CRE 542 Wireless communication and Mobile computing Technologies

Overview of Wireless Technology. Wireless Networks, Ad Hoc Networks. Wireless Devices. Personal Digital Assistants. Wireless Standards: Wireless LANs Overview, 802.11 Architecture. Wireless LAN Components. Wireless Personal Area Networks. Bluetooth Overview. Bluetooth Architecture and Components. Security of Bluetooth. Problems with the Bluetooth Standard Security.. Wireless Handheld Devices. Emerging Wireless Technologies. Educational Applications. Use of Mobile computing in education. Mobile Databases in educational environment. Mobile Applications and information sharing. Integrating educational content in wireless networks. Creation of educational podcasting. (2 units)

CRE 544 Data Mining and Security Issues

The concept of data, information and knowledge. Concept of data mining. Data Mining software and applications in problem solving and data analysis. Data warehousing, operations of data mining – classes, clusters, Association, sequential patterns. Different levels of analysis: genetic algorithms, sequential, decision trees, data visualization, etc. Technological infrastructure required for data mining. Digital Data security – authentication, password, encryption etc. Data interception and data loss. Data security management and types. (2 units)

CRE 550 Foundations of Robotics Education

An overview of Robotics in Education, Definitions of concepts – Robots, Education etc. An overview of application of robots in instructional delivery. (2 units)

CRE 552 Introduction to Robotic programming

Core computer programming logic and reasoning skills using robotic context. Robot math, Sequences of commands, Touch Sensor, Ultrasonic Sensor, Gyro sensor, and Color Sensor, Program Flow Model, Wait Until Commands, Decision-Making Structures, Loops, If/Else, Repeated Decisions, Problem-solving strategies, Teamwork (2 units)

CRE 554 Introduction to Robotic graphics

An overview of robotic graphics. Definitions of concepts. Reviews on Robot virtual world simulation, carton game robots, educational robot designs etc. (2 units)

CRE 556 Rudiments of Design and Development of Educational Robots

Rudimentary issues in design and development of educational robots. (2 units)

CRE 512 Seminar in Computer Education

Discussions and presentation of pertinent issues in Computer Education with emphasis on technologies and vocational education. (2 units)

CRE 550 Dissertation

Supervised independent investigation and research in Computer Education. (6 units)

CRE 611 Doctoral Seminar in Computer Education

Advanced discussions and presentation of pertinent issues in Computer Education with emphasis on technologies and computer education. (4 units)

CRE 613 Curriculum Studies in Computer Education

Selection and organization of instructional materials for computer Education courses. Recent and relevant curriculum practices, concepts and trends in Computer Education. Different curriculum designs appropriate for Computer Education. Principle underlying curriculum research, development and improvement. (3 units)

CRE 615 Emerging Issues and Trends in Computer Education

Trends and current Issues in Computer Education Application of computer Assisted Instructions Computer skills for the classroom. Preparation of slides and effective presentations. Computer training for industries and commerce. Capacity building for computer educators in the information age. Students are expected to deliver one seminar paper in this course. (2 units)

CRE 625 Web Design and Applications

(The Practical for this course will involve use of a good Web design application package such as DREAMWEAVER) Defining Your Site, Creating A Web Page, Page Layout. Working with, Creating Graphics, Working with Text and Alignment, Adding Effects, Optimizing Graphics for the Web, Creating Navigation Buttons, Adding Navigation Links Importing and Cleaning Up Word HTML, Inserting Content, Inserting an Email Link, Getting Your Site on the Web. (2 units)

CRE 635 Cloud computing, storage and media systems

Introduction to Cloud Computing, Characteristics, Service models, Deployment MODELS of cloud services: Communications in the Cloud: Using the communications Services, Accessing through Web APIs, Media Server Control Interfaces, Communications Scalability, Cloud Storage: Common Features of Cloud Storage Options, Web facing applications, Educational applications. (2units)

CRE 627 Collaborative Computing and e-learning Technologies

Computer-Supported Collaborative Learning: Basic Concepts, Multiple Perspectives, and Emerging Trends. Groupware and Computer Supported Cooperative Work. Aspects of Groupware: keepers, coordinators and coordination models, communicators, team agents and models. Multi-aspect Groupware. Supporting technologies and theories. Groupware taxonomies. Group ware and internet. Tools for collaboration:Local workstation applications without network. Conventional single-user programs reapplied in a collaborative context. Applications with special interface for facilitating collaboration. Network-based tools: Local Area Network-based client-server systems . E-mail . Collaborative learning in the Internet and World Wide Web. Combined multi-tool systems. Learning and teaching in a synchronous collaborative environment. (2 units)

CRE 621 ICT Multimedia and Instructional Content Development

Advanced applications of ICT skills in Instructional Content development. ICT facilities for Interactive Education. Blogs Forum, Interactive white boards, Video conferencing chats etc. Multimedia for vocational Education. Satellite Multimedia presentations. Electronic media etc. The Internet, World Wide Web, Website Designs and Development File Transfer Protocols. (2 units)

CRE 632 E-learning course Design and Development

Current approaches to e-Learning course implementation. E-learning models and platforms. Designing e-learning programmes around tested and available courseware's, (e.g. BLACKBOARD, LearnLink Virtual Classroom, etc). Online provision of learning materials. Integration of educational content and functionality. Unified authoring support. Use of authoring tools, for developing Web-based courseware. Application of educational semantic web in e-learning course design. Recent advances in Web-based learning. (2 units)

CRE 631 Software Applications for Hardware Maintenance

Studies on current software tools and utilities for computer maintenance and repair. Assessment of various application features; Asset tracking, maintenance notifications, preventive maintenance, scheduling repairs, parts inventory, History recording, work orders reporting. Advances in diagnostic software. (2 units)

CRE 633 Advanced Digital Systems Security and Forensics

A comprehensive survey of digital crimes applicable to educational system. Impact of digital crimes on Net-based educational programs. Security of online educational materials. Using Data Mining Application Tools for Forensic Analysis of Digital Devices. Design of a Digital Forensics Image Mining System. (2 units)

CRE 637 Laboratory works in hardware maintenance

Practical works in hardware maintenance . Assignments, projects and defense of practical activities. (2 units)

CRE 641 Network Protocol Design and Implementation

High and Low speed Networks, Network hardware architecture, Datagram and virtual circuits, Datagram reservation architectures, Mobility QoS in the Internet, Link sharing, Traffic aggregation. (2 units)

CRE 643 Next Generation Network Technology

Overview of Next Generation Network (NGN), Architecture of NGN, Required NGN technologies, Rationale for NGN, NGN Internet Protocol, NGN transport Network. (2 units)

CRE 645 Advanced Technology Developments in Networking and Communication

Advanced Communication techniques. Review of modern communication technologies. Various implementations of current CCITT recommendations and that of other standard organizations in the field of communication networks (2 units)

CRE 647 Practical Networking Designs

Practical works in Networking designs. Assignments, projects and defense of practical activities. (2 units)

CRE 651 Emerging trends in Robotics Education

Researches should be carried out on recent trends on robotics education and presented as seminars by students. (2 units)

CRE 653 Advanced Robotic Programming

Current-day research in artificial intelligence - the discipline of designing intelligent decision-making machines. Techniques from probability, statistics, game theory, algorithms, operations research and optimal control are increasingly important tools for improving the intelligence and autonomy of machines, whether those machines are robots surveying Antarctica, schedulers moving billions of dollars of inventory, spacecraft deciding which experiments to perform, or vehicles negotiating for lanes on the freeway. This course covers the core of AI from a modern perspective. (2 units)

CRE 656 Advanced Robotic graphics

Robot virtual world simulation, carton game robots, educational robot designs etc. Different graphical designs on instructional robots. Hands on robotic graphics. (2 units)

CRE 657 Design and Development of Educational Robots

Hands on in design and development of educational robots. (2 units)

CRE 690 Thesis

Supervised independent investigation and research in Computer Education. (12 units)