**UNIVERSITY OF NIGERIA, NSUKKA**

**FACULTY OF VOCATIONAL AND TECHNICAL EDUCATION**

**DEPARTMENT OF COMPUTER EDUCATION**

**POSTGRADUATE DEGREE PROGRAMMES**

**2016**

**DEPARTMENT OF COMPUTER EDUCATION**

**UNIVERSITY OF NIGERIA, NSUKKA**

**POSTGRADUATE DIPLOMA IN TECHNICAL EDUCATION (COMPUTER EDUCATION)**

**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.

**Objectives of the Programme**

The objectives of the programme are as follows:

1. To provide persons in teaching and administrative positions in institutions that offer computer Education who are graduates in related fields but do not possess formal professional qualifications in Computer Education with the required body of knowledge and instructions.
2. To provide foundations for higher degrees for graduates in related fields with deficiencies in professional qualifications in Computer Education but desire advancement in Computer Education as a career.
3. To equip professionally unskilled persons in institutions that offer Computer Education with the theories, practices and philosophies of Computer Education, with the aim of ensuring effectiveness in their careers.

**Scope**

The Postgraduate Diploma in Technical Education (Computer Education) programme is designed to cover foundational studies in Vocational and Technical Education and basic courses in Computer Education.

**Entry Requirements**

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.

**Employment Opportunities**

Graduates of this programme can be employed as teachers , instructors in secondary schools, technical colleges, Colleges of Education, Polytechnics, Monotechnics, Universities or training institutions. Graduates of PGDTE (Computer Education) 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 PGDTE programme specializing in Computer Education.

**Stress Areas Stress Code**

**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. Project 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

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**Second Semester**

COE 0542 Curriculum Development in Computer Education 2

COE 0544 Practical Teaching in Computer Education 3

COE 0546 Methodology in Computer Education 2

COE 0548 Seminar in Computer Education 2

EDU 0512 Educational Psychology II 2

COE 0590 Project 4

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

COE 0530 Computer Hardware Systems 2

COE 0520 Computer Software Systems 2

COE 0522 Computer Programming 2

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**COURSE DESCRIPTIONS**

**COE 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)

**COE 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)

**COE 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)

**COE 0530 Computer Hardware Systems**

Basic electricity, circuits, devices and accessories. Computer hardware components, connecting peripheral equipment. Configuring a basic workstation environment. Linking and connecting to networks. System cloning techniques, and understanding system specifications.

(2 units)

**COE 0520 Computer Software Systems**

System and Application software. BIOS software configurations. The bootstrap loader operating systems. DOS, WINDOWS, UNIX, LINUX, MACINTOSH operating systems. System utility program packages. Application software system and packages. Word processing, Spreadsheet, Database and Data Analysis packages.

(2 units)

**COE 0522 Computer Programming**

Features and syntax of computer programming languages. Subroutines, basic data structures Q-Basic programming language.

(2 units)

**UNIVERSITY OF NIGERIA NSUKKA**

**FACULTY OF VOCATIONAL AND TECHNICAL EDUCATION**

**DEPARTMENT OF COMPUTER EDUCATION**

**M.TECH AND PhD TECH IN COMPUTER EDUCATION**

**DEGREE PROGRAMMES**

**(MINIMUM BENCHMARK)**

**2016**

**DEPARTMENT OF COMPUTER EDUCATION**

**UNIVERSITY OF NIGERIA, NSUKKA**

**M.TECH/PhD DEGREE PROGRAMMES**

**Philosophy of the Programme**

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

**Entry Requirements**

1. **Master of Technology Education (M.Tech) (Computer Education)**

The following categories of candidates may be admitted on application:

1. 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.

1. Holders of Higher National Diploma who have in addition obtained a Post Graduate Diploma in Technical Education (Computer Education) at Credit level or above.
2. **Doctor of Philosophy (PhD Tech) (Computer 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 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 Programnme shall be

1. **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

1. **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

**DEPARTMENT** **OF** **COMPUTER** **EDUCATION**

**COMPUTER** **EDUCATION**

**M.TECH (COMPUTER EDUCATION)** **PROGRAMME**

**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

COE 521 Advanced Spreadsheet Processing 2

COE 511 Foundations of Computer Education 2

PGC 601 Research Methodology and Application of ICT in Research 3

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**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**

COE 520 Advanced Database design and Implementation 2

COE 522 Presentation Graphics Applications 2

COE 524 Media Literacy and Distance Education 2

COE 526 Instructional Software Development in Computer Education 2

**B. HARDWARE MAINTENANCE AND MANAGEMENT**

COE 530 Computer hardware Maintenance and Management 2

COE 532 Hardware security and Digital Forensics 2

COE 534 Introductory Laboratory hardware maintenance practices 2

COE 536 Advanced Computer Architecture/Assembling for Voc. Education 2

**C. NETWORKING AND COMMUNICATION TECHNOLOGY**

COE 540 Data Communication and internet Security 2

COE 542 Wireless communication and Mobile computing 2

COE 544 Data Mining and Security Issues 2

COE 546 Data Communication Architecture and Protocols in Tech. Education 2

**D. ROBOTICS EDUCATION**

COE 550 Foundations of Robotic Education 2

COE 552 Introduction to Robotic programming 2

COE 554 Introduction to Robotic graphics 2

COE 556 Rudiments of Design and Development of Educational Robots 2

**Third Semester**

**Course No. Course Title Units**

COE 512 Seminar in Computer Education 2

COE 590 Dissertation 6

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

12

**Second semester**

COE 610 Doctoral Seminar in Computer Education 4

COE 612 Curriculum Studies in Computer Education 3

COE 614 Emerging issues/trends in Computer Education 2

9

**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**

COE 621 ICT Multimedia and Instructional Content Development 2

COE 623 E-learning course Design and Development 2

COE 625 Web Design and Applications 2

COE 627 Collaborative Computing and e-learning Technologies 2

**B.** **HARDWARE** **MAINTENANCE AND** **MANAGEMENT**

COE 631 Software Applications for Hardware Maintenance 2

COE 633 Advanced Digital Systems Security and Forensics 2

COE 635 Cloud computing, storage and media systems 2 COE 637 Laboratory works in hardware maintenance 2

**C.** **NETWORKING AND COMMUNICATION TECHNOLOGY**

COE 641 Network Protocols Design and Implementation 2

COE 643 Next Generation Network Technology 2

COE 645 Advanced Technology Developments in Networking and Communication 2

COE 647 Practical Networking Designs 2

**D. ROBOTICS EDUCATION**

COE 651 Emerging trends in Robotic Education 2

COE 653 Advanced Robotic Programming 2

COE 655 Advanced Robotic graphics 2

COE 657 Design and Development of Educational Robots 2

**Fifth Semester**

COE 690 Thesis 12

**TOTAL 41**

**COURSE DESCRIPTIONS**

**COE 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)

**COE 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)

**COE 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)

**COE 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 Clonning Techniques.

(2 units)

**COE 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)

**COE 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)

**COE 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)

**COE 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)

**COE 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)

**COE 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)

**COE 534 Introductory Laboratory hardware maintenance practices**

Introductory laboratory practical in hardware maintenance. Mainly projects, assignments and applications.

(2 units)

**COE 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)

**COE 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)

**COE 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)

**COE 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)

**COE 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)

**COE 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)

**COE 556 Rudiments of Design and Development of Educational Robots**

Rudimentary issues in design and development of educational robots.

(2 units)

**COE 512 Seminar in Computer Education**

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

(2 units)

**COE 550 Dissertation**

Supervised independent investigation and research in Computer Education.

(6 units)

**PGC 601 Research Methodology and Application of ICT in Research**

**(Masters Degree Course)**

In-dept research work aimed at acquiring full knowledge and presentation in scholarly writing of the concepts, issues, trends in the definition and development of the study area from African and Western perspectives. Major steps in research: Selection of problem, Literature review, Design, Data collection, analysis and interpretation, conclusions. Study of various research designs, Historical, Case studies, surveys, descriptive, cross sectional experimental, etc. Analysis, surveys and synthesis of conceptual and philosophical foundations of different disciplines. Identification of research problems and development of research data and the format for presenting research results (from designing the table of contents to referencing, bibliography and appendix). Data analysis and result presentation in different disciplines using appropriate analytical tools. Methods of project/dissertation writing. Application of appropriate advanced ICT tools relevant in every discipline for data gathering, analysis and result presentation. Essentials of spreadsheets, Internet technology, and Internet search engines. All registered Masters Degree students must attend a solution based interactive workshop to be organised by the School of Postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.

**COE 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)

**COE 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)

**COE 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)

**COE 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)

**COE 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)

**COE 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)

**COE 621 ICT Multimedia and Instructional Content Development**

Advanced applications of ICT skills in Instructional Content developemnt. 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)

**COE 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)

**COE 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)

**COE 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)

**COE 637 Laboratory works in hardware maintenance**

Practical works in hardware maintenance . Assignments, projects and defense of practical activities.

(2 units)

**COE 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)

**COE 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)

**COE 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)

**COE 647 Practical Networking Designs**

Practical works in Networking designs. Assignments, projects and defense of practical activities.

(2 units)

**COE 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)

**COE 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)

**COE 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)

**COE 657 Design and Development of Educational Robots**

Hands on in design and development of educational robots.

(2 units)

**COE 690 Thesis**

Supervised independent investigation and research in Computer Education.

**PGC 701: Synopsis and Grant Writing**

Identification of types and nature of grant and grant writing; mining of grants application calls on the internet. Determining appropriate strategy for each grant application. Study of various grant application structures and contents and writing of concept notes, detailed project description, budgeting and budget defence. Study of sample grant writings in various forms and writing of mock research and other grants. Identification of University of Nigeria synopsis structure and requirements, (Introduction, Methodology and Results). Determining the contents of each sub-unit of the synopsis. Steps in writing synopsis from the Dissertation/Thesis document. Structural and language issues. Common errors in synopsis writing and strategies for avoiding them. The roles of the student and the supervisor in the production of a synopsis. Writing of mock synopsis.

All registered Ph.D students must attend a solution-based interactive workshop to be organised by the School of Postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.

(12 units)