

Tribhuvan University
Faculty of Education

Office of the Dean



BACHELOR OF INFORMATION AND COMMUNICATION TECHNOLOGY EDUCATION (BICTE)

Sixth Semester Curriculum

Office of the Dean

Faculty of Education

Tribhuvan University

Kathmandu

Amal Kumar
प्रज्ञिक परिषद्को कार्यालय
कोतिपुर

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Ed.462 Research in Education

Course Title: Research in Education

Course No.: Ed 462

Level: Bachelor

Semester: Sixth

Program: BICTE

Nature of Course: Theoretical

Credit Hours: 3

Teaching hours: 48

1. Course Description

This course is designed to provide students with basic understanding and skills of educational research. It helps students understand meaning and types of educational research, select appropriate strategies for carrying out educational research and prepare research proposal and report. In addition, this course helps students distinguish between qualitative and quantitative research and select appropriate data collection and analysis strategies for both types of research. It further familiarises students with the meaning of action research and the process of carrying out action research in educational setting. The course prepares the students to carry out small-scale educational research.

2. General Objectives

The general objectives of the course are as follows:

- To provide students with understanding of research and educational research.
- To acquaint students with steps in educational research
- To help students understand the meaning of quantitative research and enable them to carry out quantitative research.
- To enable students understand the meaning of qualitative research and to carry out qualitative research.
- To acquaint students with the meaning of action research and enable them to carry out action research.
- To enable students to prepare research proposal and research report.

3. Specific objectives and contents

Specific Objectives	Contents
<ul style="list-style-type: none"> • Discuss the meaning of research and educational research. • Select research problems from the educational field. • List steps in educational research and explain each of them. 	Unit I Introduction to Educational Research (8) 1.1 Meaning of research and educational research 1.2 Research issues and problems in educational field 1.3 Steps in educational research 1.3.1 Selecting a problem 1.3.2 Reviewing the literature 1.3.3 Designing the research 1.3.4 Collecting the data 1.3.5 Analysing the data 1.3.6 Interpreting the findings 1.3.7 Drawing conclusions



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<ul style="list-style-type: none"> • Provide the meaning and characteristics of quantitative research. • Explain the quantitative sampling methods and use them in educational research. • Develop the data collection tools for quantitative research. • Analyse the quantitative data using simple statistics. • Distinguish among experimental, survey and correlational research. 	<p>Unit II Quantitative Research (12)</p> <p>3.1 Meaning and characteristics of quantitative research</p> <p>3.2 Random sampling: Simple and stratified</p> <p>3.3 Data collection tools: Questionnaire, test, scales and check list</p> <p>3.4 Statistical analysis: frequency, percentage, mean and standard deviation</p> <p>3.5 Types of quantitative research</p> <p>3.5.1 Experimental research</p> <p>3.5.2 Survey research</p> <p>3.5.3 Correlational Research</p>
<ul style="list-style-type: none"> • Provide the meaning and characteristics of qualitative research. • Explain the types of purposive sampling appropriate in qualitative research. • Use the coding and thematic analysis techniques for analysing the qualitative data. • Distinguish between ethnography and narrative study with examples. 	<p>Unit III. Qualitative Research (12)</p> <p>3.1 Meaning and characteristics of qualitative research</p> <p>3.2 Purposive sampling</p> <p>3.3 Data collection strategies: semi-structured and unstructured interview, participant observation, focus group discussion</p> <p>3.4 Coding and thematic analysis</p> <p>3.5 Types of qualitative research</p> <p>3.5.1 Ethnography</p> <p>3.5.2 Narrative study</p>
<ul style="list-style-type: none"> • Explain the meaning and characteristics of action research. • Discuss the steps of carrying out action research. • Provide examples of action research from the educational field. • Explain the process of action research report. 	<p>Unit IV Action Research (6)</p> <p>4.1 Meaning and characteristics of action research</p> <p>4.2 Action research cycle</p> <p>4.2.1 Planning</p> <p>4.2.2 Acting</p> <p>4.2.3 Observing</p> <p>4.2.4 Reflecting</p> <p>4.3 Preparing action research report</p>
<ul style="list-style-type: none"> • Discuss the purpose of writing research proposal. • List and explain the various components of research proposal. • List and explain the various components of research report. • Use citation and referencing using APA format in preparing the research report. 	<p>Unit V Writing research proposal and research report (10)</p> <p>5.1 Purpose of writing research proposal</p> <p>5.2 Components of research proposal</p> <p>5.2.1 Introduction: background, research problem, objectives, delimitation</p> <p>5.2.2 Literature review</p> <p>5.2.3 Methodology: design, sampling, data collection tools and data analysis</p> <p>5.3 Components of research report</p>

	5.3.1 Introduction 5.3.2 Literature review 5.3.3 Methodology 5.3.4 Analysis and findings 5.3.5 Summary, conclusion and implications 5.3.6 References 5.3.7 Appendices 5.4 Citation and referencing using APA style
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4. Instructional Techniques

4.1 General Instructional Techniques

- Introductory presentation on each topic of the unit by the teacher
- Use of lecture, question answer, discussion, brainstorming and buzz sessions for the theoretical contents.

4.2 Specific Instructional Techniques

Unit	Suggested specific instructional techniques
I	<ul style="list-style-type: none"> • Students will individually prepare at least 5 research problems and share them in the class. The teacher will provide feedback on their works.
II	<ul style="list-style-type: none"> • Students will be divided in groups and each group will select a research problem appropriate for quantitative research. They will devise a set of questionnaire/rating scale/check list for collecting the data. Each group will present the tools in the class. The teacher will provide feedback on their works.
III	<ul style="list-style-type: none"> • Students will individually conduct one qualitative interview, transcribe the interview and develop 2-3 themes using coding and thematic analysis technique. The students will share their works in the class. The teacher will provide feedback on their works.
IV	<ul style="list-style-type: none"> • Students will be divided into groups and each group will select an educational problem for action research. They will prepare a plan to carry out the action research. Finally, they will share their plans in the whole group. The teacher will provide feedback on their works.
V	<ul style="list-style-type: none"> • Students will be divided into groups and they will select a research topic and prepare a research proposal. They will present the proposal in the class. The teacher will provide feedback on their works.

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5. Evaluation

5.1 Internal Evaluation 40%

Internal evaluation will be conducted by subject teacher based on following activities:

• Attendance	5
• Class participation	5
• First assignment (Individual work based on Unit III)	10
• Second assignment (Group work based on Unit II, IV and V)	10
• Third assignment (Written test: objectives and subjective)	10
• Total	40

5.2 Final/Semester Evaluation 60%

Examination Division, Office of the Dean, Faculty of Education will conduct final examination at the end of semester. The number of questions and allocated marks are given below:

• Objective type question (multiple choice 10 x 1mark) = 10	
• Short answer questions (6 questions with 2 OR questions x 5 marks) =30	
• Long answer questions (2 questions with 1 OR questions x 10 points) =20	
• Total	60

Recommended books

Ary, D., Jacobs, L.C., Sorensen, C. & Walker, D.A. (2014). *Introduction to research in education* (9th ed.). Belmont, CA: Wadsworth (Unit 1 to 4).

Gay, L.R., Mills, G.E. & Airasian, P. (2006). *Educational research: competencies for analysis and applications* (8th ed.). Upper Saddle River, NJ: Pearson (Unit 1 to 5).

Best, J.W. and Kahn, J.V. (2006). *Research in education* (10th ed.). Upper Saddle River, NJ: Pearson/Allyn and Bacon (Unit 1 to 5)

Reference books

Altrichter, H., Posch, P. & Somekh, B. (1993). *Teachers investigate their work: An introduction to the methods of action research*. London: Routledge

Creswell, J. W. (2012). *Educational research: Planning, conducting and evaluating quantitative and qualitative research* (4th ed.). Boston: Pearson.



ICT.Ed.465 Visual Programming**Course Title: Visual Programming**

Course No.: ICT.Ed.465

Level: Bachelor

Semester: Sixth

Program: BICTE

Nature of course: Theoretical + Practical

Credit Hour: 3 hours (2T+1P)

Teaching Hour: 64 hours (32+32)

1. Course Description

This course aims to equip students with a foundational understanding of object-oriented programming concepts and the ability to proficiently create contemporary software applications utilizing the .NET framework and C#. Its primary objective is to furnish application developers with a comprehensive grasp of Microsoft® .NET through C#, offering essential skills for building robust C# applications integrated with databases.

2. General Objectives

The general objectives of this course are as follows:

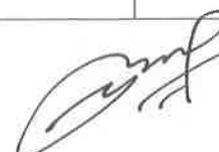
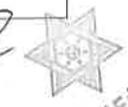
- To explain the .NET Framework ecosystem for the development of Graphical User Interface (GUI) applications
- To develop a strong understanding of the fundamental ideas in object-oriented programming and the structure and syntax of the C# language.
- To create and build user-friendly applications with interactive interfaces, and developed full functional web solutions using object-oriented principles.

3. Specific Objectives and Contents

Specific Objectives	Contents	Lecture Hours (Th + Pr)
<ul style="list-style-type: none"> • Outline the features and architecture of the .NET framework • Provide an overview of the C# IDE • Illustrate the working environment within Visual Studio 	Unit I: Introduction to .NET 1.1. .NET framework: Features and Architecture 1.2. .NET Components: Common Language Runtime, Class Library 1.3. .NET Framework, .NET Core, and .NET Standard 1.4. Introduction of Visual Studio and Visual Studio Code IDE, Setting up Visual Studio Development Environment, IntelliSense 1.5. Project Types in .NET	2+2
<ul style="list-style-type: none"> • Describe the basic features, uses and structure of C# language. • Design the Control structure using looping expressions and array in C# language. • Explain and implementation of OOP concept with its key features • Explain the use of constructor, interfaces and abstract classes • Design and deploy exception handling techniques 	Unit II: Basics of C# 2.1. Introduction 2.2. Data Types, Operators, Variables 2.3. Control Statements 2.4. Arrays, Classes, Structures, Enumerations 2.5. Partial Classes, Static classes, Sealed Classes 2.6. Constructors and Destructor 2.7. Concept and implementations of Inheritance and Polymorphism 2.8. Concept and implementation of Interfaces 2.9. Virtual Methods, Abstract classes and Methods 2.10. Exception Handling	6+6




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<ul style="list-style-type: none"> Describe the delegate, lambda expression, and events Explain and define string operation and implement string expression Explain and implementation of collections in C# 	Unit III: Delegates and String 3.1. Delegates 3.2. Lambda Expression and its implementation 3.3. Event Handling 3.4. String Manipulation and String Builder 3.5. Collections: Generic and Non-generic	4+4
<ul style="list-style-type: none"> Explain and implementation of Entity Framework with various Database approaches Explain and implementation of the LINQ 	Unit IV: Entity Framework and LINQ 4.1. Introduction to Entity Framework 4.2. Understanding and Implementing Database First, Code First, Model First 4.3. LINQ and its implementation of LINQ	4+4
<ul style="list-style-type: none"> Explain the use of ASP.NET frameworks for different applications Database Interaction and routing in ASP.NET MVC Explain the C# Razor in ASP.net pages 	Unit V: ASP.NET 5.1. ASP.NET vs ASP.NET Core 5.2. ASP.NET Frameworks for Web Applications: Web Forms, ASP.NET MVC, and ASP.NET Web Pages 5.3. Creating a simple Web Forms application 5.4. Understanding ASP.NET MVC architecture 5.5. Creating models, views, controllers and URL routing in ASP.NET MVC 5.6. Creating a basic layout for ASP.NET Web Pages 5.7. Razor syntax for embedding code in HTML, Working with variables, loops and logical expressions 5.8. Database interaction with ASP.NET MVC	8+8
<ul style="list-style-type: none"> Identify the basics of database connection with its architecture Design the application with the database. Execute the connection and execute the basic commands to a database Implement the database in Entity Framework 	Unit VI: Database Programming 6.1. Introduction to ADO.NET, ADO.NET architecture 6.2. DataReader, Dataset, DataTable and DataAdapter 6.3. Database Connection and working with Database Specific Classes (SqlConnection, SqlCommand, SqlTransaction) 6.4. Accessing data with ADO.NET, implementing CRUD operations, Executing Commands (ExecuteNonQuery(), ExecuteReader(), ExecuteScalar()) 6.5. Stored Procedure and working with Stored Procedures 6.6. Database and Entity Framework	8+8

4. Instructional Techniques

The instructional techniques for this course are divided into two groups. The first group consists of general instructional techniques applicable to most of the units. The second group consists of specific instructional techniques applicable to particular units.

4.1. General Technique

Students will receive reading materials for each unit, and all units incorporate lectures, discussions, the use of a multimedia projector, and brainstorming sessions.

Jana Kalyan

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4.2. Specific Instructional Technique

The demonstration is an essential instructional technique for all units in this course during teaching-learning process. Specifically, demonstration with practical works will be the specific instructional technique in this course. The details of suggested instructional techniques are presented below:

4.3. Laboratory Work

A minimum of 20 exercises has been established by the faculty. These exercises will cover a wide range of real-life and scientific problems, ranging from the creation of small programs to the development of moderately complex subroutines, as well as the design of programs for practical applications and problem-solving scenarios. To assess students, laboratory assignments will be conducted in groups of two to four. Overall, the Laboratory Work should encompass assignments and exercises from the specified areas below:

1. Control Flow
2. Class and object
3. Static and Dynamic binding
4. Constructor and destructors
5. OOPs and implementation of key features
6. Delegates, Events and Lambda
7. Collections
8. Entity framework and LINQ
9. ASP.NET Frameworks for GUI applications
10. ADO.net and Entity framework.

4.4. Project Work

Develop and deploy a real-life application using the concepts covered in visual programming course. Project Presentation and Project report should be prepared and submitted to the External Examiner appointed by dean office for practical work evaluation.

5. Evaluation

Internal Assessment	Semester Examination	External Practical Exam/ VIVA	Total Marks
40 Marks	40 Marks	20 Marks	100 Marks

Note: Students must pass separately in internal assessment, external practical exam and semester examination.

5.1. Internal Evaluation (40 marks)

Internal evaluation will be conducted by subject teacher based on following criteria:

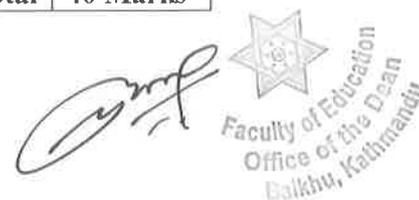
1) Class Attendance	5 marks
2) Learning activities and class performance	5 marks
3) First assignment (Written Assignment)	10 marks
4) Second assignment (Case Study/ Project Work with Presentation)	10 marks
5) Terminal Examination	10 marks
Total	40 Marks

5.2. Semester Examination (40 marks)

Examination Division, Dean office will conduct final examination at the end of semester:

1) Objective questions (Multiple choice 10 questions x 1 mark)	10 marks
2) Subjective answer questions (6 questions with 2 'OR' x 5 marks)	30 marks
Total	40 Marks


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5.3. External Practical Examination/ VIVA (20 marks)

Examination Division, Dean Office will conduct final practical examination at the end of semester.

6. Recommended books and References materials (including relevant published articles in national and international journals)

6.1. Recommended Books and References

1. Adam Freeman, A. (2023). *Pro ASP.NET Core 7*, 10th Edition. Manning Publication
2. Stellman, A., & Greene, J. (2021). *Head First C#: A Learner's Guide to Real-World Programming with C# and .NET Core*, 4th Edition, O' Really Media
3. Albahari, J. (2022). *C# 10 in a Nutshell*, 1st Edition. O'Reilly.
4. Smith, J.P. (2021). *Entity Framework Core in Action*, 2nd Edition. Manning Publication
5. Michael B. White, M.B. (2019). *Mastering C#: A Step by Step Guide for the Beginner, Intermediate and Advanced User, Including Projects and Exercises*. Independently Published
6. Schildt, H. (2010). *C# 4.0: The Complete Reference*, 1st Edition. McGraw-Hill
7. Patrick, T. (2010). *Microsoft ADO.NET 4 Step by Step*, 1st Edition, O' Really Media
8. Mueller, J.P. (2013). *Microsoft ADO.NET Entity Framework Step by Step*. Microsoft Press



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<ul style="list-style-type: none"> to recall the definition of points and lines in computer graphics. to implement the DDA algorithm. to implement the Bresenham's line drawing algorithm. to utilize the Midpoint Circle algorithm to draw circle 	<p>2.1 Pixel and Straight Line 2.2 Line Drawing Algorithms: Digital Differential Analyzer (DDA), Bresenham's Line Drawing 2.3 Midpoint Circle Algorithm</p> <p>Practical Works</p> <ul style="list-style-type: none"> Write program to draw a line using DDA algorithm. Write program to draw a line using Bresenham's line drawing algorithm. Write program to draw a circle using Midpoint circle algorithm. Write program to draw different geometrical shapes with the help of library functions/methods.
<ul style="list-style-type: none"> To define different types of 2D and 3D Transformations To represent 2D and 3D transformations in homogeneous form to generate successive and composite transformations To define viewing pipeline to apply transform objects from world coordinate to viewing coordinate 	<p>Unit III: 2D and 3D Transformation 6T+6P</p> <p>3.1 2D and 3D Transformations: Translation, Rotation (about origin and arbitrary point), Scaling (about origin and arbitrary point), Reflection and Shear 3.2 Representation of 2D and 3D Transformation in Homogeneous Coordinate System 3.3 Successive and Composite Transformations 3.4 Window to Viewport Transformations 3.5 2D and 3D Viewing Pipeline</p> <p>Practical Works</p> <ul style="list-style-type: none"> Write program to illustrate all types of 2D and 3D transformations
<ul style="list-style-type: none"> to understand clipping and its need to apply point clipping to utilize Cohen-Sutherland line clipping algorithm to illustrate Sutherland-Hodgeman polygon clipping algorithm 	<p>Unit IV: Clipping 4T+6P=10</p> <p>4.1 Introduction to Clipping 4.2 Point Clipping 4.3 Line Clipping o Cohen-Sutherland Line Clipping Algorithm 4.4 Polygon Clipping o Sutherland-Hodgeman Polygon Clipping Algorithm</p> <p>Practical Works</p> <p>Write program to implement</p> <ul style="list-style-type: none"> Point Clipping Cohen-Sutherland line clipping algorithm Sutherland Hodgeman Polygon Clipping algorithm
<ul style="list-style-type: none"> to define 3D object to derive the parallel and perspective projection matrices 	<p>Unit V: Three Dimensional Graphics 9T+5P</p> <p>5.1 3D Object Representation : Polygon Table 5.2 Projection: Definition and Types, Derivation of Parallel and Perspective Projection Matrices</p>

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<ul style="list-style-type: none"> • to understand different types of visible surface detection methods • to identify basic illumination models • to apply polygon rendering methods • to know the idea behind color models 	<p>5.3 Visible Surface Detection Methods: Object Space (Depth Sorting) and Image Space (Z-Buffer, A-Buffer and Scanline) Methods</p> <p>5.4 Basic Illumination model: Ambient Light, Specular Highlights and Diffuse Reflection</p> <p>5.5 Polygon Rendering Methods: Constant, Gouraud and Phong Shading</p> <p>5.6 RGB, HSV and CMYK Color models</p> <p>Practical Works</p> <ul style="list-style-type: none"> • Write program to create 3D object. • Write program to illustrate parallel projection • Write program to illustrate perspective projection
<ul style="list-style-type: none"> • to understand the simulation, animation and virtual reality concept • to make use of animation tool 	<p>Unit VI: Computer Simulation, Animation and Virtual Reality 3T+3P</p> <p>6.1 Introduction to Computer Animation</p> <p>6.3 Introduction to Simulation</p> <p>6.4 Introduction of Virtual Reality</p> <p>Practical Works</p> <ul style="list-style-type: none"> • Use Animation tool to create simple animated video

4. Instructional Techniques

The instructional techniques for this course are divided into two groups. First group consists of general instructional techniques applicable to most of the units. The second group consists of specific instructional techniques applicable to specific units.

5.1 General Techniques

- Providing the reading materials to the students to familiarize the units.
- Lecture, question-answer, discussion, brainstorming, practical, and buzz session.

5.2 Specific Instructional Techniques

5. Evaluation

Evaluation of students' performance is divided into parts: Internal assessment and internal and external practical examination and theoretical examinations. The distribution of points is given below:

Internal Assessment	External Practical Exam/Viva	Semester Examination (Theoretical exam)	Total Points
40 Points	20 Points	40 Points	100 Points

Note: Students must pass separately in internal assessment, external practical exam and semester examination.

5.1 Internal Assessment (40 Points)

Internal assessment will be conducted by subject teacher based on following criteria:

- 1) Class Attendance 5 points
- 2) Learning activities and class performance 5 points

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3) First assignment (written assignment)	10 points
4) Second assignment (Case Study/project work with presentation)	10 points
5) Terminal Examination	10 Points

Total	40 points
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5.2 Semester Examination (40 Points)

Examination Division, Dean office will conduct final examination at the end of semester.

Objective question (Multiple choice questions 10 x 1 mark)

10 Marks

Short answer questions (6 questions with 2 OR ques x 5 marks)

30

Marks

Total

40 Marks

5.3 Practical Exam/Viva (20 Points)

Examination Division, Dean Office will conduct final practical examination at the end of semester. Practical record book, practical written test, demonstration of practical activities and viva are assessment indicators.

6. Prescribed Textbook

Hearn and Baker, "Computer Graphics, C Version", Second Edition, Prentice- Hall of India Private Limited, 2003

7. Recommended Books and References

1. Edward Angel and Dave Shreiner *Interactive Computer Graphics A Top-Down Approach With Shader-Based OPENGL*, 6th edition ISBN-13: 978-0-13-254523-5
2. Peter Shirley and Steve Marschner ,*Fundamentals of Computer Graphics*, Third Edition CRC Press Taylor & Francis Group 13: 978-1-4398-6552-1
3. Issac Victor Kerlow, *The Art of 3D Computer Animation and Effects*, John Wiley, 2004, ISBN:0471430366.

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ICT.Ed.468 Network SecurityCourse Title: **Network Security**

Course No.: ICT. Ed 468

Level: Bachelor

Semester: Sixth

Program: **BICTE**

Nature of course: Theoretical + Practical

Credit Hour: 3 (2+1)

Teaching Hour: 64(32+32)

1. Course Description

The course, Network Security, is a major course for students studying towards acquiring the Bachelor in Information Communication Technology Education (BICTE). This course aims to provide fundamental skills needed to understand the internal and external security threats against a network, and to implement security policies that will protect an organization's information. The course objective is to impart fundamental understanding of every facet of information security, security policies, cryptography, authentication, security of network, system, user and program, identifying malware, perform vulnerability analysis, auditing and attacks and responses to those attacks.

2. General Objectives

The general objectives of this course are as follows:

- Develop an understanding of computer security and its mechanism.
- Gain familiarity with prevalent network and system attacks, defenses against them, and forensics to investigate the aftermath.
- Develop a basic understanding of cryptography, how it has evolved, and some key encryption techniques used today.
- Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.

3. Course Outlines:

Specific Objectives	Contents	Hours (Th+Pr)
<ul style="list-style-type: none"> • Explain the concept of Computer Security. • Understand the basic terminologies related to security. 	1. Introduction 1.1 The Basic Components 1.2 Threats 1.3 Policy and Mechanism 1.4 Assumptions and Trust 1.5 Assurance 1.6 Operational and Human Issues	3
<ul style="list-style-type: none"> • Explain Security policies and its types • Develop confidentiality, integrity, and availability policies 	2. Policies 2.1 Security Policies 2.1.1 The Nature of Security Policies 2.1.2 Types of Security Policies 2.1.3 The Role of Trust 2.1.4 Example: Academic Computer Security Policy 2.2 Confidentiality Policies	5+5

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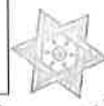


<ul style="list-style-type: none"> • Configure Network devices to enhance security. • Explain the different types of encryption and decryption techniques in network. • Identify and discuss the different strategies used to secure wired and wireless network. • Explain the mechanism of System, User, Program, Email, Web and Database Security. • Install and configure the firewall to achieve its benefits. • Make use of VPN to secure electronic communication. 	<p>4.1.2 Encryption and Decryption in Network</p> <p>4.1.3 Firewall and its types</p> <p>4.1.4 Wired and Wireless Security</p> <p>4.1.5 Virtual Private Network</p> <p>4.2 System Security</p> <p>4.3 Email, Web and Database Security</p> <p>4.4 User Security</p> <p>4.4.1 Access</p> <p>4.4.2 Files and Devices</p> <p>4.4.3 Electronic Communications</p> <p>4.5 Program Security</p> <p>4.5.1 Common Security-Related Programming Problems</p> <p><u>Practical Works</u></p> <ul style="list-style-type: none"> • Configure routers, switches, and other network devices to enhance security. • Assess and secure web applications against common security threats. Use tools like OWASP ZAP or Burp Suite for web application security testing. • Configure firewalls to control and monitor network traffic. 	
<ul style="list-style-type: none"> • Explain the different methods of intrusion detection. • Perform vulnerability analysis. • Conduct penetration testing. • Know different types of Malicious Software. • Design an auditing system. • Engage in simulated attacks and develop response techniques to overcome the attacks. 	<p>5. Threats, Assessment and Solutions</p> <p>5.1 Malware</p> <p>5.1.1 Introduction</p> <p>5.1.2 Trojan Horses</p> <p>5.1.3 Computer Viruses</p> <p>5.1.4 Computer Worms</p> <p>5.1.5 Bots and Botnets</p> <p>5.1.6 Other Malware</p> <p>5.1.7 Theory of Computer Viruses</p> <p>5.1.8 Defenses</p> <p>5.2 Vulnerability Analysis</p> <p>5.2.1 Penetration Studies</p> <p>5.2.2 Vulnerability Classification</p> <p>5.3 Auditing</p> <p>5.3.1 Definition</p> <p>5.3.2 Designing an Auditing System</p> <p>5.3.3 Examples: Auditing File Systems</p> <p>5.4 Intrusion Detection</p> <p>5.4.1 Principles</p> <p>5.4.2 Basic Intrusion Detection</p> <p>5.4.3 Organization of Intrusion Detection Systems</p>	9+12

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	<p>5.5 Attacks and Responses</p> <p>5.5.1 Attacks</p> <p>5.5.2 Representing Attacks</p> <p>5.5.3 Intrusion Response</p> <p>5.5.4 Digital Forensics</p> <p><u>Practical Works</u></p> <ul style="list-style-type: none"> • Conduct vulnerability assessments on systems and networks using tools such as Nessus or OpenVAS. • Conduct security audits to assess the overall security posture of an organization. • Develop and deliver security awareness training programs for naive users. • Engage in simulated attacks on systems to identify vulnerabilities. Use tools like Metasploit or Wireshark to analyze network traffic and find potential security weaknesses. 	
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4. Instructional Techniques

The instructional techniques for this course are divided into two groups. First group consists of general instructional techniques applicable to most of the units. The second group consists of specific instructional techniques applicable to specific units.

4.1 General Techniques

- Providing the reading materials to the students to familiarize the units.
- Lecture, question-answer, discussion, brainstorming, practical, and buzz session.

4.2 Specific Instructional Techniques

Unit	Activity and instructional techniques	Teaching Hours(64)
1 to 5	Use network security tools to implement the algorithm	

5. Evaluation (Internal Assessment and External Assessment):

Nature of course	Internal Assessment	External Practical Exam/Viva	Semester Examination	Total Marks
Theory	40%	20%	40%	100%

Note: Students must pass separately in internal assessment, external practical exam / viva and or semester examination.


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5.1 Evaluation for Part I (Theory)

5.1.1 Internal Evaluation 40%

Internal evaluation will be conducted by course teacher based on following activities:

6) Attendance	5 points
7) Participation in learning activities	5 points
8) First assessment (written assignment)	10 points
9) Second assessment (Term examination)	10 points
10) Third assessment (Internal Practical Exam/Case Study)	10 points
Total	40 points

5.2 External Evaluation (Final Examination) 40%

Examination Division, office of the Dean, Faculty of Education will conduct final examination at the end of semester.

- 1) Objective type question (Multiple choice 10questions x 1mark) 10 marks
- 2) Short answer questions (6 questions with 2 OR ques x 5 marks) 30 marks

Total	40 marks
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6.1 Evaluation for part II (practical) 20%

Nature of the course	Semester final examination by External Examiner	Total percent
Practical	100%	100

6.2.1 Practical Examination Evaluation Scheme

- a) External assessment100%
 - i) Record book 20%
 - ii) Laboratory work exam/Case.....40%
 - iii) VIVA.....40%

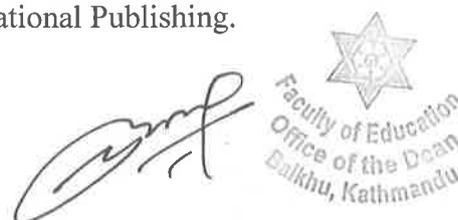
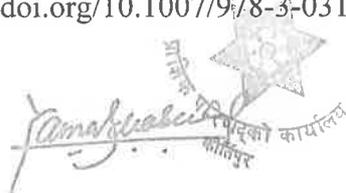
Recommended books and reading materials (including relevant published articles in national and international journals)

6.1 Prescribed Text Book

- Bishop, M. (2018). *Computer Security: Art and Science, 2nd Edition*. Addison-Wisely Professional.

6.2 Reference Materials

- Elahi, A., & Cushman, A. (2024). *Computer Networks: Data Communications, Internet and Security*. 1st Edition. Springer International Publishing.
<https://doi.org/10.1007/978-3-031-42018-4>



- Ortega, J.M. (2023). *Python for Security and Networking: Leverage Python modules and tools in securing your network and applications*, 3rd Edition. Packt Publishing
- Kaufman, C. (2022). *Network security: private communication in a public world*, 3rd Edition. Delhi: Prentice Hall PTR.
- Stinson, D.R., & Paterson M.B. (2018). *Cryptography: Theory and Practice*, 4th Edition. CRC Press
- Stallings, W. (2013). *Network security essentials: applications and standards*, 6th Edition. Delhi: Prentice Hall.
- Maiwald, E. (2017). *Fundamentals of Network Security*, 1st Edition. Delhi: McGraw-Hill Technology Education.



ICT.Ed.469 Digital Pedagogy

Course Title: Digital Pedagogy

Course No.: ICT Ed. 469

Level: Bachelor

Semester: Six

Program: BICTE

Nature of Course: Theoretical + Practical

Credit Hours: 3 (2T+1P)

Teaching Hours: 64 (32T+32P)

1. Course Description

This course explores to the integration of technology and education, using a focus on the concepts and techniques of digital pedagogy as an instrument of enhancing the process of learning. The course will cover fundamental ideas including e-learning, the journey towards E-Learning 3.0, incorporating the use of digital tools, gamification approaches, learning management systems (LMS), and the development of impactful learning exercises. The evaluation of student performance will be prioritised using a range of assessment methodologies.

This course also explore the possibilities of digital pedagogy and transform teacher approach to teaching and learning in the digital age.

2. Course Objectives

The general objectives of this course are as follows:

- Explore the foundations of e-learning, evolution, and role in modern education.
- Demonstrate the eLearning 3.0 tools and their integration into instructional design for enhanced learning outcomes.
- Explore gamification principles and techniques to increase student engagement and motivation.
- Gain practical skills in utilizing learning management systems for resource management and performing student activities on online and blended learning.
- Explore various assessment methods and strategies for evaluating student performance in digital learning contexts.

3. Specific Objectives and Contents

Specific objectives	Contents
<ul style="list-style-type: none"> • Recall the historical development and fundamental principles of e-learning. • Differentiate between synchronous and asynchronous learning methods • Examine the evolution of e-learning to E-Learning 3.0, including the emergence of Virtual Learning Environments (VLEs), and assess their importance amidst associated challenges. 	<p>UNIT I: Concept of e-Learning (6T+2P)</p> <p>1.1 Concept of E-learning 1.2 Synchronous Vs Asynchronous Learning 1.3 Concept of E-Learning 3.0 1.4 Concept of Virtual Learning Environment (VLE) 1.5 Concept of Digital Pedagogy and TPACK Framework 1.6 Importance and challenges of e-learning</p> <p>Practical Activities</p> <ul style="list-style-type: none"> • Surfing the five key e-Learning portals and explore the key features • Demonstrate the any one VLE online environment and explores the key features




<ul style="list-style-type: none"> • Recall Pedagogy Wheels and e-learning tools for education. • Explain the use of social media platforms like Facebook, YouTube, and LinkedIn for educational activities. • Utilize podcasting tools for creating audio-based learning materials. • Evaluate the integration of AI generative tools for educational purposes. • Apply AI-based translator, rephrase, summarizer, and plagiarism detector tools for educational content creation. • Implement online quiz maker tools effectively to create interactive assessments and engage learners in the learning process. 	<p>UNIT II: e-Learning 3.0 Tools and Integration (6T+8P)</p> <p>2.1 Concept of Pedagogy Wheels and e-learning tools</p> <p>2.2 Use of Social Media Features for learning such as Facebook, YouTube and LinkedIn etc.</p> <p>2.3 Integration of Podcasting tools for learning such as audacity etc.</p> <p>2.4 Integration of AI Generative tools for learning such as Open AI ChatGPT, Google Gemini, Bing Copilot</p> <p>2.5 AI based translator, rephrase, summarizer and plagiarism detector tools for education such as google translator, quillbot etc.</p> <p>2.6 Integration of online quiz maker tools for learning</p> <p>Practical Activities</p> <ul style="list-style-type: none"> • Demonstrate three features of Facebook, YouTube and LinkedIn for learning • Use any one Podcasting tool and broadcast the recorded audio. • Create educational learning materials using AI generative tools such as Open AI ChatGPT, Google Gemini, Copilot and explore the key features • Integrate the AI generative tools in MS Word, Excel, PowerPoint and email. • Integrate the AI generative tools in Google Doc, Presentation, Gmail and Calendar. • Integrate any one online quiz maker tools such as Quizizz
<ul style="list-style-type: none"> • Define the concepts of gamification, storytelling, and the block based applications for gaming. • Explore the application of Scratch and Apps Inventor for gaming, including their basic components. • Apply Scratch blocks and Apps Inventor components to create gaming projects. • Analyze the importance of gamification in learning and its relevance to educational contexts. 	<p>UNIT III: Gamification on Learning (6T+10P)</p> <p>3.1 Concept of Gamification in Education</p> <p>3.2 Concept of story telling</p> <p>3.3 Application of MIT Scratch for gaming</p> <p>3.4 Different categories of Scratch blocks: Motion, Looks, Sound, Events, Control, Sensing, and Operators.</p> <p>3.5 Application of MIT Apps Inventor for gaming</p> <p>3.6 Basic Components of Apps Inventor: user interface, layout, media, sensor.</p> <p>3.7 Importance of gamification in learning</p> <p>Practical Activities</p> <ul style="list-style-type: none"> • Develop any two story-telling project using Scratch block programming • Develop any two gaming-project using Scratch block programming • Develop any two mobile apps for learning using MIT Game Inventor tools
<ul style="list-style-type: none"> • Define the concept of Learning Management Systems (LMS) and their role in education. 	<p>UNIT IV: LMS and Learning Resources Design (8T+6P)</p>

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<ul style="list-style-type: none"> • Explore the characteristics and advantages of open-source-based LMS tools. • Apply create course and learner enrollment processes in LMS. • Create and upload text-based materials (PDFs) to an LMS for course content delivery. • Utilize LMS functionalities to create, upload, and manage multimedia materials such as audio, video, and website links for enhanced learning experiences. 	<p>4.1 Concept of Learning Management System (LMS)</p> <p>4.2 Open source based LMS tools</p> <p>4.3 LMS course and learner enrollment</p> <p>4.4 Create and upload the text base (PDF) materials in LMS</p> <p>4.5 Create and upload the audio/video/website materials (weblink) in LMS</p> <p>Practical Activities</p> <ul style="list-style-type: none"> • Create one Course/Class/Team using Moodle or Google Classroom or MS Team or similar tools • Enroll user/students in a specific course using Moodle or Google Classroom or MS Team or similar tools • Create, upload and assign to a PDF based text materials using Moodle or Google Classroom or MS Team or similar tools • Create, upload and assign to audio, video and web link materials using Moodle or Google Classroom or MS Team or similar tools
<ul style="list-style-type: none"> • Recall formative and summative assessments in online and blended learning. • Apply quizzes and assignments as assessment tools in online education. • Apply strategies for student engagement through chat and discussion. • Establish environment for communication and collaboration's role in online learning. • Evaluate feedback's importance and impact on learning outcomes. 	<p>UNIT V: Learning Activities and Evaluation students' performance (6T+ 6P)</p> <p>5.1 Formative and Summative Assessments in online/blended learning</p> <p>5.2 Assessment: Quiz and Assignments</p> <p>5.3 Student Engagement and Participation: Chat and Discussion Forum</p> <p>5.4 Communication and collaboration: Collaborative work, peer work and workshop</p> <p>5.5 Feedback and Reflection</p> <p>Practical Activities</p> <ul style="list-style-type: none"> • Create a quiz and assign to student for self-evaluation using Moodle or Google Classroom or MS Team or similar tools • Create assignment with grid and assign to students using Moodle or Google Classroom or MS Team or similar tools • Create a discussion forum using Moodle or Google Classroom or MS Team or similar tools • Create a collaborative task or workshop using Moodle or Google Classroom or MS Team or similar tools. • Provide the feedback and reflection note on students activities as an online mode using Moodle or Google Classroom or MS Team or similar tools



4.0 Instructional Techniques

The instructional techniques for this course are divided into two groups. First group consists of general instructional techniques applicable to most of the units. The second group consists of specific instructional techniques applicable to particular units.

4.1 General Instructional Techniques

Reading materials will be provided to students in each unit. Lecture preferably with the use of multi-media projector, demonstration, practical classes, discussion, and brain storming are used in all units.

4.2 Specific Instructional Techniques

Demonstration is an essential instructional technique for all units in this course during teaching-learning process. Specifically, demonstration with practical works will be specific instructional technique in this course.

5.0 Evaluation :

Internal Assessment	External Practical Exam/Viva	Semester Examination	Total Marks
40 Points	20 Points	40 Points	100 Points

Note: Students must pass separately in internal assessment, external practical exam and semester examination.

5.1 Internal Evaluation (40 Points):

Internal evaluation will be conducted by subject teacher based on following criteria:

- | | |
|--|-----------|
| 11) Class Attendance | 5 points |
| 12) Learning activities and class performance | 5 points |
| 13) First assignment (written assignment) | 10 points |
| 14) Second assignment (Case Study/project work with presentation) | 10 points |
| 15) Terminal Examination | 10 Points |

Total	40 points
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5.2 Semester Examination (40 Points)

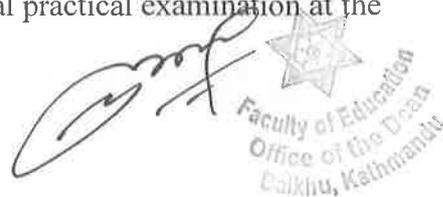
Examination Division, Dean office will conduct final examination at the end of semester.

- 1) Objective question (Multiple choice 10 questions x 1 mark) 10 Marks
- 2) Subjective answer questions (6 questions with 2 OR ques x 5 marks) 30 Marks

Total	40 Marks
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5.3 External Practical Exam/Viva (20 Points):

Examination Division, Dean Office will conduct final practical examination at the end of semester.

5.4 Practical Exam/Viva (20 Points)

Internal assessment (Record Book-4 points, Project work Presentation- 2, Internal Practical Test- 2 Points)	Semester final examination	Total
8 Points	12 Points	20 Points

6. Recommended Books and References materials (including relevant published articles in national and international journals)

References

1. Nilson, L. B., & Goodson, L. A. (2018). Online teaching at its best. Jossey-Bass, A Wiley Imprint.
2. Bryn Holmes, John Gardner(2006), *E-learning: concepts and practice* , Sage Publications Ltd
3. Jason Cole & Helen Foster, *Using Moodle; Teaching with the Popular Open Source Course Management System*, O Reilly Community Press
4. Rosenberg, M.J. (2000a). E-Learning: Strategies for Delivering Knowledge in the Digital Age: McGraw-Hill.
5. France, P. E., & Tomlinson, C. A. (2020). Reclaiming personalized learning: A pedagogy for restoring *equity and humanity in our classrooms* (First edition). Corwin.
6. Singh & Sharma, E-Learning New Trends and Innovations, Deep & Deep Publications Private Ltd., New Delhi, 2005
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9. https://docs.moodle.org/403/en/Main_page
10. <https://edu.google.com/>
11. <https://learn.microsoft.com/>



