Tribhuvan University

Faculty of Education

Office of the Dean

BACHELOR OF INFORMATION AND COMMUNICATION TECHNOLOGY EDUCATION (BICTE)

Curriculum 1st Semester

Effective from the Administration Batch 2078 BS

Office of the Dean

Faculty of Education

Tribhuvan University

Kathmandu

प्राविक परिषद्को कार्यालय
कीर्तिपुर

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

BACHELOR OF INFORMATION AND COMMUNICATION TECHNOLOGY EDUCATION (BICTE)

Curriculum

First Semester

List of Subject

Introduction

1. Faculty of Education (FOE)

The faculty of education (FOE) is a leading institution in the field of teacher education in Nepal. It was started as the College of Education in 1956, before the establishment of Tribhuvan University (TU) in 1959. Since its establishment, FOE has been implementing pre-service and in-service teacher education program through its constituent and affiliated campuses located in different parts of the country. The faculty of Education (FOE) is the largest faculties under Tribhuvan University in terms of the number of students and the number of campuses that are ever-increasing. With its 26 constituent campuses and 560 affiliated campuses throughout the country, it has the biggest network of teacher training. FoE has been contributing to the nation by producing and supplying all kinds of human resources needed for schools and educational sector of the country. It has conducted diverse educational programmes in a wider range of subject areas including social studies, science and information communication and technology education (ICT) education. Faculty of Education (FOE) currently offers educational programs in Bachelor of Education (B.Ed.), Master of Education (M.Ed.), Master of Philosophy (M.Phil.) and Doctor of Philosophy (PhD) in Education. Bachelors and Masters programmes are blended with the academic contents and professional courses.

2. FOE's Mission and Aim

Vision

Faculty of Education envisions the promotion of quality education across the country through the preparation of highly qualified teachers.

Mission

The mission of Faculty of Education is to provide leadership to teacher education and professional development in the country by developing itself as a center of excellence for teacher education and training, educational studies, research and innovation.

Goals

The goal of FOE is to produce trained teachers, teacher educators, and educational researchers for the country. It also aims at producing educational planners and managers, curriculum designers and human resources needed for the educational sector of the country through its different programmes. It also aims to transcend knowledge, skills and abilities through a sound pedagogical system in order to prepare educated manpower well equipped with sound knowledge and functional capacities

3. Introduction to Bachelor of Education Program

University (TU) has undergone changes from time to time according to the needs and demands of the country. Since its establishment, College of Education/FoE had introduced two-year Bachelor of Education (B.Ed.) combining subject specific courses (Nepali, English, Science, Mathematics, Health and Physical Education, Social Studies etc.) with professional pedagogical courses including teaching practice with a view to producing trained teachers within two years and supplying them to secondary schools. This type of tradition and practices in teacher preparation programme continued for four decades. Duration of B.Ed. Program was increased from two years to three years in 1996. FoE had implemented three-year B.Ed. Programmes up to 2015.

Bachelor of Education (B.Ed.) conducted by Faculty of Education (FoE), Tribhuvan Before 1996 Two-Year B. Ed. with single area specialization was in practice for several years. In order to address the criticism made against the graduates of two-year B.Ed. programme as being poor in contents, the duration of B.Ed. programme was made Three-Year with single area specialization from 1996. Four –year B. Ed. with two areas specialization has been implemented since 2016 according to the needs of the schools and demands of Ministry of Education. Four-year B.Ed. is integrated undergraduate programme that combines theoretical courses in different subject areas such as English, Nepali, Science, Mathematics, History, Political Science, Economics, Geography, Population, Social Studies, Health and Physical education, and core professional courses including teaching practicum. Four-Year B.Ed. with major Information and Communication Technology Education (ICTE) had been implemented in five constituent campuses and seven affiliated colleges for five years. In 2021 B.Ed. ICT programme was modified into BICTE Programme.

4. Bachelor of Information and Communication Technology Education (BICTE) Programme

Bachelor of Information and Communication Technology Education is a new and specialized programme of FOE, which has been implementing in its Constituent and Affiliated Campuses since 2021. BICTE is 8 semesters (4 years) undergraduate degree programme, which provides students a broad rage of proficiency in Information and Communication Technology hardware concept, programming, data structure, management

information system, computer graphics, computer graphics, Artificial Intelligence, Web Programming, software development, and foundation knowledge and skills to be a ICT teachers. The BICTE programme is designed to prepare students with sound knowledge and skills in ICT as well as pedagogy for teaching computer science, and providing innovative solution to education of digital world.

5. Goal and Objectives of BICTE Programme

The goal of Bachelor of Information and Communication Technology Education (BICTE) program is to develop socially responsive, creative, and result oriented information communication technology (ICT) professionals in the field of education sector. It aims at equipping graduates with the skills and attributes required to be effective and efficient teacher professionals in the field of Information and Communication Technology Education

6. The Objectives of the programme

These are the specific objective of programme

- Prepare competent ICT teachers/instructors for teaching computer science, digital pedagogical and ICT related discipline in schools and education sectors of the country
- Prepare IT professionals proficient in the use of computers and computational techniques in order to develop effective application and system to solve real life problems in the educational industries.
- Prepare students to proceed on to postgraduate level study in ICT within and outside the country.

7. Eligibility Condition for Admission

The candidate applying for admission to the BICTE program must have

- Successfully completed a twelve-year schooling (grade 12) or its equivalent from any university, board or institution recognized by Tribhuvan University.
- Minimum C grade in each subject of grade 12 with CGPA 2 or more / Secured at least second division in the 10+2, PCL or equivalent program; and
- Complied with all the application procedure.

8. Admission Criteria

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

Written Test: Eligible applicants are required to appear in the central level entrance test commonly known as Central Education Admission Test (CEAT) conducted by the Faculty of Education. The test will follow the international testing pattern and standards. It includes the areas like: ICT skill and interest, language understanding, logical reasoning and educational philosophy understanding.

There shall be altogether one hundred (100) objective questions in the CEAT containing ICT skill test (40%), Mathematical Test (25%), English Skill (15%) and Educational GK (20%) questions in each section with a total weight of 100 marks. Student must secure a minimum of 40% in the CEAT in order to qualify for the interview.

Interview: Applicants securing above cut off point marks in the CEAT will be short-listed. Only short-listed candidates will be interviewed and selected for admission as per the need of campus.

9. Instructional Techniques

The instructional techniques in BICTE program will be the combination of several approaches. Class lecture, group discussion, demonstration, guest lecture, field visit etc. are instructional techniques regularly used. Importantly, seminars, case analysis, problem solving and field work approaches will be used as specific instructional techniques for giving instruction in the effective delivery of courses. Technology integration and digital pedagogy should be applied to teaching learning process.

10. Teaching Hours:

Each semester will be of 5 months. The teaching hours for courses depend on the nature of courses whether it is full theoretical, or theoretical and practical, and practical, or fully practical. Most of the courses are of 3 credit hours. One credit hour in theoretical courses carries 16 teaching hours and course of 3 credit hours will have 48 teaching hours. For fully practical, and theoretical and practical courses, one credit hour will have 32 to 48 teaching hours departing on the specialization areas.

11. Teaching Practicum

In the final semester, students shall be attached to educational institutions where they have to work for a period of seven weeks. Each student shall prepare an individual project report in the prescribed format based on his / her work in the respective organization assigned to him / her.

Evaluation of the internship shall be based on the confidential report by the organization, project report and presentation of the report. The report must be submitted by the end of the eighth semester. Students must secure a minimum grade of "C" in the internship. The internship carries a weight equivalent to 3 credit hours.

12. Examination, Evaluation and Grading System

The BICTE program will be executed through the semester system. The regular program shall be completed in eight semesters. The internal (ongoing) evaluation and the external (end of semester) examination shall carry 40 percent and 60 percent weightage respectively. The semester examinations shall be conducted by FOE. The final grade of the student shall be determined on the overall performance in the internal and external examinations.

13. Passing Grade and Grading System

The final evaluation of students is done through the examination conducted by Tribhuvan University. Students must secure a minimum of grade 'B-' or Grade Point Average (GPA) of 2.70 in the internal evaluation in order to qualify to appear in the semester examination. In order to pass the semester examination, the student must secure a minimum of grade 'B-' or the Cumulative Grade Point Average (CGPA) of 2.70. The grading system shall be as follows:

Letter Grade	GP	SGPA / CGPA Range	Percentage Equivalent	Remarks
A	4	4	90 & above	(Distinction) Outstanding
A-	3.7	3.70 to 3.99	80-89.9	(First Division) Excellent
B+	3.3	3.30 to 3.69	70-79.9	(First Division) Very Good
B	3.0	3.00 to 3.29	60-69.9	(Second Division) Good
B-	2.7	2.70 to 2.99	50-59.9	(Third Division) Satisfactory
F	0	Below 2.70	Below 50	Fail

Note: GP: Grade Point, SGPA: Semester Grade Point Average, CGPA: Cumulative Grade Point Average

14. Make up/Retake Exam

Make up/Retake examination will be conducted as per the semester guideline 2074; section 4(10).

15. Attendance

Students are required to attend regularly all theory and practical classes, assignments, study tour, field trip, seminars and presentations as required by the course. A student is required to attend at least 80 percent of such activities in order to qualify for the semester examination.

प्राविधिक परिषद्को कार्यालय
कीर्तिपुर

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

16. Credit Transfers and Withdraw

The program allows students to transfer the credits earned by them in similar program of other universities recognized by Tribhuvan University.

A student who has partially completed the BICTE program and would like to discontinue his / her studies shall also be allowed to withdraw from the program. In such cases, a certificate specifying the credit earned by the student in the program shall be provided.

17. Graduation Requirements

The BICTE program extends over eight semesters (four academic years). The BICTE degree is awarded upon its successful completion of all the following requirements specified by the curriculum. The successful completion of 132 credit hours as prescribed with a minimum of passing grade in all courses with an aggregate CGPA of 2.70. Completion of courses for the fulfillment of the requirements of the BICTE program must occur within seven years from the time of registration.

18. Curricular Structure

The BICTE program requires the students to study 4 Year 8 Semester and 132 credit hours. The curricular structure of the program comprises of the following eight separate course components.

S.N.	Course Categories	Semester								Total Course	Total Credit Hours (3 Credit to each)
		1st	2nd	3rd	4th	5th	6th	7th	8th		
1	Communication Skills	2	2	-	-	-	-	-	-	4	12
2	Professional/Core Education	1	1	1	1	1	1	1	1	8	24
3	ICT Core Courses	2	2	3	3	3	4	2	2	21	63
4	Specialization/Elective	-	-	-	-	-	-	1	1	2	6
5	Math and Analytical Course	1	1	1	1	1	-	-	-	5	15
6	Life Skills	-	-	1	1	-	-	-	-	2	6
7	Capstone Project	-	-	-	-	-	-	1	-	1	3
8	Teaching Practice	-	-	-	-	-	-	-	1	1	3
Total		6	6	6	6	5	5	5	5	44	132

Course Titles:

1. **Communication Skills Course**
   - 1.1 Eng. Ed. 411: English Language-I
   - 1.2 नेपा .शि .४११ :साधारण नेपाली-१
   - 1.3 Eng. Ed. 421: English Language-II
   - 1.4 ने शि .४२१ :साधारण नेपाली-२
2. **Professional/Core Education Course**
   - 2.1 Ed. 411: Fundamental of Education
   - 2.2 Ed. 422: Developmental Psychology
   - 2.3 Ed. 432: Learning Psychology
   - 2.4 Ed. 442: Fundamentals of Curriculum
   - 2.5 Ed. 452: Assessment in Teaching and Learning
   - 2.6 Ed. 462: Research Methods in Education
   - 2.7 Ed. 472: Research Project
   - 2.8 Ed. 482: Classroom Pedagogy
3. **Mathematics and Analytical Course**
   - 3.1 Math Ed. 416: Mathematics-I
   - 3.2 Math Ed. 426: Mathematics-II
   - 3.3 Math Ed. 436: Probability and Statistics
   - 3.4 Math Ed. 447: Numerical Analysis
   - **3.5** Math Ed. 456: Discrete Mathematics
4. **Life Skills course**
   - 4.1 ICT Ed. 438: 21st Century life Skill
   - 4.2 Ed. 444: Educational Leadership in Digital Era
5. **ICT Core Courses**
   - 5.1 ICT Ed. 415: Introduction to Information Technology
   - 5.2 ICT Ed. 416: Programming Concept with C
   - 5.3 ICT Ed. 425: Digital Logics
   - 5.4 ICT Ed. 426: Object Oriented Programming with C++
   - 5.5 ICT Ed. 435: Data Structure and Algorithm
   - 5.6 ICT Ed. 436: Computer Architecture and Organization
   - 5.7 ICT Ed. 437: Web Technology
   - 5.8 ICT Ed. 445: Operating System
   - 5.9 ICT Ed. 446: Database Management System
   - 5.10ICT Ed. 447: System Analysis and Design
   - 5.11ICT Ed. 455: Java Programming Language
   - 5.12ICT Ed. 456: Data Communication and Networks
   - 5.13ICT Ed. 457: Software Engineering and Project Management
   - 5.14ICT Ed. 465: Visual Programming
   - 5.15ICT Ed. 466: Computer Graphics
   - 5.16ICT Ed. 467: Digital Pedagogy and LMS
   - 5.17ICT Ed. 475: Network and Information Security
   - 5.18ICT Ed. 476: Artificial Intelligence in Education
   - 5.19ICT Ed. 477: Teaching Methods for ICT
   - 5.20 ICT Ed. 486: System administrator with Linux
   - 5.21ICT Ed 487: Python Programming
6. **Specialization/Elective course**

   Elective I(Any one):
   - 6.1 ICT Ed 478 Geographical Information System (GIS)
   - 6.2 ICT Ed 479 Big Data Analysis

   Elective II(any One):
   - 6.3 ICT Ed 488 Cloud Computing
   - 6.4 ICT Ed 489 Multimedia Technology
7. **Capstone Project**
   - 7.1 ICT Ed. 480: Capstone Project
8. **Teaching Practice**
   - 8.1 Ed 481 Teaching Practices in ICT

Semester Break Down for First and Second Semester:

First Semester (6 x 3=18 Credit)		Second Semester (6 x 3=18 Credit)	
S.N.	Course Titles	S.N.	Course Titles
1	Eng. Ed. 411: English Language-I	1	Eng. Ed. 421: English Language-II
2	Nep. Ed.411: General Nepali-1	2	ने शि .४२१ :साधारण नेपाली-२
3	Ed. 411: Fundamental of Education	3	Ed. 422: Developmental Psychology
4	Math Ed. 416: Mathematics-I	4	Math Ed. 426 Mathematics-II
5	ICT Ed. 415: Introduction to Information Technology	5	ICT Ed. 425: Digital Logics
6	ICT Ed. 416: Programming Concept with C	6	ICT Ed. 426: Object Oriented Programming with C++

Third Semester (6 x 3=18 Credit)		Fourth Semester (6 x 3=18 Credit)	
S.N.	Course Titles	S.N.	Course Titles
1	Ed. 432: Learning Psychology	1	Ed. 442: Fundamentals of Curriculum
2	ICT Ed. 435: Data Structure and Algorithm	2	ICT Ed. 445: Operating System
3	ICT Ed. 436: Computer Architecture and Organization	3	ICT Ed. 446: Database Management System
4	ICT Ed. 437: Web Technology	4	ICT Ed. 447: System Analysis and Design
5	Math Ed. 436: Probability and Statistics	5	Math Ed. 446: Numerical Analysis
6	ICT Ed. 438: 21st Century life Skill	6	Ed. 444: Educational Leadership in Digital Era

Fifth Semester (5 x 3=15 Credit)		Sixth Semester (5 x 3=15 Credit)	
S.N.	Course Titles	S.N.	Course Titles
1	Ed. 452: Assessment in Teaching and Learning	1	Ed. 462: Research Methods in Education
2	ICT Ed. 455: Java Programming Language	2	ICT Ed. 465: Visual Programming
3	ICT Ed. 456: Data Communication and Networks	3	ICT Ed. 466: Computer Graphics
4	ICT Ed. 457: Software Engineering and Project Management	4	ICT Ed. 467: Digital Pedagogy
5	Math Ed. 456: Discrete Mathematics	5	ICT Ed. 475: Network and Information Security

Seven Semester (5 x 3=15 Credit)		Eight Semester (5 x 3=15 Credit)	
S.N.	Course Titles	S.N.	Course Titles
1	Ed. 472: Research Project	1	Ed. 482: Classroom Pedagogy
2	Ed. 476: Artificial Intelligence in Education	2	486: System administrator with Linux
3	ICT Ed. 477: Teaching Methods for ICT	3	487: Python Programming
4	**Elective I(Any one):** ICT Ed 478 Geographical Information System (GIS) ICT Ed 479 Big Data Analysis	4	**Elective II (any One):** ICT Ed 488 Cloud Computing ICT Ed 489 Multimedia Technology
5	ICT Ed. 479: Capstone Project	5	ICT Ed 490 Teaching Practicum in ICT

BICT First Semester Full Course

ने.शि. ४११ : साधारण नेपाली-१

पाठ्यांश सङ्केत : ने.शि. ४११ | पाठ्यांश प्रकृति : सैद्धान्तिक

तह : स्नातक | क्रेडिट आवर : ३

सेमेस्टर : पहिलो | शिक्षण घन्टी : ४८

---

१. पाठ्यांशको परिचय

यस पाठ्यांशले नेपाली भाषामा विशिष्ट बोध, अभिव्यक्ति र रचना कौशलको विकास गर्ने लक्ष्य राखेको छ । यस पाठ्यांशमा नेपाली भाषाको परिचय, यसका मानक कथ्य र लेख्य रूपको स्वरूप र प्रकार्य क्षेत्र, शब्दभण्डार, वाक्यतत्त्वपरक रचना, नेपाली वाङ्मयका विविध क्षेत्रका गद्यांशको पठनबोध, बुँदाटिपोट र संक्षेपीकरणको अभ्यास, व्यावहारिक लेखन तथा सूचना तथ्यको रूपान्तरका साथै निर्धारित साहित्यिक कृतिहरूको पठन, आस्वादन र अभिव्यक्ति क्षमताको विकास गर्ने पाठ्यवस्तु राखिएका छन् ।

२. साधारण उद्देश्यहरू

यस पाठ्यांशका साधारण उद्देश्यहरू निम्नानुसार रहेका छन् :

- नेपाली भाषाको स्वरूप, प्रयोगको स्थिति र प्रकार्य क्षेत्रका साथै सन्दर्भपूर्ण वाक्य निर्माणमा सक्षम तुल्याउने,
- निर्धारित गद्यांशबाट विशिष्ट बोध प्रश्नको उत्तर लेखन, बुँदाटिपोट र संक्षेपीकरणको अभ्यासमा दक्ष बनाउने,
- निर्धारित वाक्यकोटिमा आधारित भई स्वतन्त्र र निर्देशित रचना लेख्न सक्षम तुल्याउने,
- व्यावहारिक लेखनको सिप विकासमा दक्ष बनाउने,
- तालिका, चित्राकृति, रेखाचित्र र आरेखका सूचनालाई अनुच्छेदमा रूपान्तरण गर्न सक्ने बनाउने,
- निर्दिष्ट साहित्यिक विधा सरसरती पठन, आस्वादन र प्रतिक्रिया लेखनको अभ्यास गराउने ।

३. विशिष्ट उद्देश्य र पाठ्यवस्तु

विशिष्ट उद्देश्य	पाठ्यवस्तु
• नेपाली भाषाको कथ्य र लेख्य रूपको परिचय दिन • नेपाली भाषाको प्रयोग क्षेत्र बताउन • पहिलो र दोस्रो भाषाका रूपमा नेपाली भाषाको स्थिति पहिल्याउन • नेपाली भाषाका विशिष्ट प्रकार्यहरू उल्लेख गर्न • नेपालीका शब्दस्रोत र शब्दवर्गको पहिचान गरी तिनको प्रयोग गर्न • शब्दनिर्माणको प्रक्रिया बताउन	**एकाइ एक : नेपाली भाषाको परिचय, प्रयोग र शब्दभण्डार** (८) १.१ कथ्य र लेख्य नेपाली भाषा १.२ नेपाली भाषाको प्रयोगक्षेत्र १.३ पहिलो भाषाका रूपमा नेपाली भाषाको प्रयोग १.४ दोस्रो भाषाका रूपमा नेपाली भाषाको प्रयोग १.५ नेपाली भाषाका विशिष्ट प्रकार्यहरू १.५.१ शिक्षा १.५.२ साहित्य १.५.३ कानुन १.५.४ सञ्चार १.५.५ प्रशासन १.५.६ ज्ञानविज्ञान १.६ नेपाली शब्दभण्डार १.६.१ शब्द स्रोत • तत्सम • तद्भव

	• आगन्तुक शब्दहरूको प्रयोग र प्रस्तुति १.६.२ शब्दवर्गको प्रयोग र प्रस्तुति • नाम, सर्वनाम, विशेषण • क्रिया, नामयोगी, क्रियायोगी • संयोजक, विस्मयादिबोधक • निपात १.६.३ शब्दनिर्माण प्रक्रियाको प्रयोग र प्रस्तुति • सर्गपद्धति – उपसर्ग, प्रत्यय (कृत्, तद्धित) • समास र द्वित्व पद्धति
• नेपाली वाङ्मयका विभिन्न विषयक्षेत्रसँग सम्बन्धित बोधात्मक प्रश्नको उत्तर दिन । • विभिन्न विषयक्षेत्रसँग सम्बन्धित बुँदाटिपोट र संक्षेपीकरणको प्रयोग र अभ्यास गर्न, • वाक्यकोटिअनुरूप वर्णनात्मक प्रकृतिका स्वतन्त्र अनुच्छेद रचना गर्न, • निर्देशित वाक्यकोटिलाई वाक्यान्तरण गर्न ।	**एकाइ दुई : पठनबोध, बुँदाटिपोट, सङ्क्षेपीकरण र वाक्यतत्वपरक रचना** (१६) **२.१ पठनबोध** २.१.१ नेपाली वाङ्मयका विविध क्षेत्र र विषयसँग सम्बन्धित सामान्य र विशिष्ट बोध प्रश्नहरूको उत्तर लेखन र प्रस्तुति (भाषा, साहित्य, शिक्षा, भूगोल, कृषि, अर्थवाणिज्य, सूचना तथा सञ्चार, मनोविज्ञान, समाज, संस्कृति, दर्शन, विज्ञान तथा प्रविधि र स्वास्थ्य, वातावरण, कानुन, खेलकुद) **२.२ बुँदा टिपोट र संक्षेपीकरण** २.२.१ बुँदाटिपोटको प्रयोग र प्रस्तुति २.२.२ संक्षेपीकरणको प्रयोग र प्रस्तुति **२.३ वाक्यतत्त्वपरक रचना** २.३.१ लिङ्ग, वचन, पुरुष र आदरका आधारमा स्वतन्त्र रचना २.३.२ लिङ्ग, वचन, पुरुष र आदरका आधारमा वाक्यान्तरण
• व्यावहारिक लेखन गर्न ।	**एकाइ तिन : व्यावहारिक लेखन** (६) ३.१ निवेदन ३.२ भर्पाई ३.३ मन्जुरीनामा ३.४ तम्सुक ३.५ जाहेरी ३.६ कार्यालयीय टिप्पणी ३.७ भौचर (गोश्वारा भौचर र बैङ्क भौचर)
• सूचना र तथ्यलाई अनुच्छेदमा रूपान्तर गर्न,	**एकाइ चार : सूचना र तथ्यको रूपान्तरण** (६) ४.१ तालिका तथा चित्राकृति (वृत्ताकार तथा स्तम्भाकृति) मा प्रस्तुत सूचना र तथ्यलाई अनुच्छेदमा रूपान्तर ४.२ रेखाचित्र तथा आरेखमा प्रस्तुत तथ्य र सूचनालाई अनुच्छेदमा रूपान्तर
• निर्धारित साहित्यिक कृतिको सरसर्ती अध्ययन गरी प्रतिक्रियात्मक उत्तर लेख्न ।	**एकाइ पाँच : साहित्यिक कृतिको पठन, आस्वादन र प्रतिक्रियात्मक लेखन** (१२)

	५.१ कथा ५.१.१ विश्वेश्वरप्रसाद कोइराला : **एक रात** ५.१.२ भागीरथी श्रेष्ठ : **मातृत्वको चित्कार** ५.१.३ राजेन्द्र विमल : **चरा बोल्छ** **५.२ कविता** ५.२.१ लक्ष्मीप्रसाद देवकोटा : **यात्री** ५.२.२ माधवप्रसाद घिमिरे: **एकै र मुठी धरतीको धूलो** ५.२.३ अमर गिरी : **चराका गीतहरू** **५.३ निबन्ध :** ५.३.१ शङ्कर लामिछाने : **जीवन : एक प्राध्यापक** ५.३.२ भैरव अर्याल : **महापुरुषको सङ्गत** **५.४ एकाङ्की** ५.४.१ हृदयचन्द्रसिंह प्रधान : **मरुभूमिका लेखक**

४. प्रायोगिक क्रियाकलाप र शिक्षण प्रविधि

प्रायोगिक क्रियाकलाप र शिक्षण प्रविधिलाई दुई समूहमा विभाजन गरिएको छ : पहिलोमा साधारण शिक्षण प्रविधि र दोस्रोमा विशिष्ट शिक्षण प्रविधि ।

४.१ साधारण शिक्षण प्रविधि

प्रत्येक एकाइमा आवश्यकताअनुसार शिक्षकले सम्बन्धित विषयवस्तुको प्रस्तुति, व्याख्यान, छलफल, प्रश्नोत्तर गराई विद्यार्थीहरूलाई तत्सम्बन्धी अभ्यास गर्न लगाइने छ ।

४.२ विशिष्ट शिक्षण प्रविधि

एकाइ		क्रियाकलाप
एक		सामूहिक क्रियाकलापका रुपमा शब्द स्रोत, शब्दवर्ग र शब्दनिर्माण प्रक्रियाको प्रयोग र प्रस्तुति गर्न लगाउने
दुई		• बुँदाटिपोट र संक्षेपीकरणको प्रयोग र प्रस्तुतिमा व्यक्तिगत र सामूहिक अभ्यास गराउने • लिङ्ग, वचन, पुरुष र आदरका आधारमा स्वतन्त्र र निर्देशित रचना लेख्ने अभ्यास गराउने र कक्षामा प्रस्तुत गर्न लगाउने
ीतन		प्रयोजनपरक बोधको अभ्यास र प्रस्तुतिमा व्यक्तिगत र सामूहिक अभ्यास गराउने ।
चार		जोडी समूहमा विभिन्न प्रकारका निर्देशित र स्वतन्त्र अनुच्छेद तथा निबन्धलेखनका साथै प्रतिवेदन लेखन र कक्षा प्रस्तुतिमा सहभागी गराउने ।
पाँच		निर्धारित साहित्यिक कृतिको पठन, आस्वादन र प्रतिकियात्मक लेखनका लागि व्यक्तिगत वा सामूहिक अभ्यास गर्न लगाउने ।

५. मूल्याङ्कन प्रक्रिया

मूल्याङ्कन दुई प्रकारले गरिनेछ :

५.१ **आन्तरिक मूल्याङ्कन** : यसका निम्ति चालिस प्रतिसत अङ्क निर्धारण गरिएको छ ।

आन्तरिक मूल्याङ्कन (४० प्रतिशत)

क्रियाकलाप	अङ्क

• उपस्थिति	५
• सिकाइ क्रियाकलापमा सहभागिता	५
• पहिलो आन्तरिक परीक्षा	१०
• दोस्रो आन्तरिक परीक्षा	१०
• तेस्रो आन्तरिक परीक्षा	१०
जम्मा	**४०**

५.२ **बाह्य मूल्याङ्कनः** यसका निम्ति साठी प्रतिशत अङ्क निर्धारण गरिएको छ। आन्तरिक मूल्याङ्कन कक्षा शिक्षणसँगै गरिनेछ र बाह्य मूल्याङ्कन डिन कार्यालयले निर्धारण गरेको सेमेस्टर प्रणालीअनुसार हुने छ। यसका लागि निम्नानुसारको प्रश्नका लागि निम्न अनुसारको अङ्क विभाजन गरिएको छ।

बाह्य परीक्षा (६० प्रतिशत)

प्रश्नको किसिम	**अङ्क**
• वस्तुगत प्रश्न (१०X१ = १०)	१०
• संक्षिप्त उत्तरात्मक प्रश्न (वैकल्पिक २) (६X ५ = ३०)	३०
• विवेचनात्मक प्रश्न (वैकल्पिक १) (२X१० = २०)	२०
जम्मा	**६०**

पाठ्यपुस्तक

गौतम, देवीप्रसाद, भण्डारी, पारसमणि र ओझा, रामनाथ (२०७०), *स्नातक नेपाली,* काठमाडौं : विद्यार्थी पुस्तक भण्डार (सम्बद्ध अंश मात्र)।

सन्दर्भ सामग्री

अर्याल, भैरव (२०७१), *जयभुँडी,* काठमाडौं : रत्न पुस्तक भण्डार। (एकाइ पाँचका लागि)
कोइराला, विश्वेश्वरप्रसाद (२०६०), *दोषी चस्मा,* ललितपुर : साझा प्रकाशन। (एकाइ पाँचका लागि)
गौतम, देवीप्रसाद र घिमिरे, कृष्णप्रसाद (सम्पा.) (२०६३), *नेपाली कथा भाग ३,* ललितपुर : साझा प्रकाशन। (एकाइ पाँचका लागि)
गिरी, अमर (२०६३), *चराका गीतहरू,* ललितपुर : साझा प्रकाशन। (एकाइ पाँचका लागि)
घिमिरे, माधवप्रसाद (२०६०), *किन्नरकिन्नरी,* ललितपुर : साझा प्रकाशन। (एकाइ पाँचका लागि)
देवकोटा, लक्ष्मीप्रसाद (२०६२), *लक्ष्मी कविता सङ्ग्रह,* ललितपुर : साझा प्रकाशन।
प्रधान, हृदयचन्द्रसिंह (२०६१), 'मरुभूमिका लेखक', *साझा एकाङ्की,* ललितपुर : साझा प्रकाशन। (एकाइ पाँचका लागि)
लामिछाने, शङ्कर (२०५८), *गोधूली संसार,* ललितपुर : साझा प्रकाशन। (एकाइ पाँचका लागि)
विमल, राजेन्द्र (२०६१), *आँखाका समयहरू,* काठमाडौं : साङ्ग्रिला प्रकाशन। (एकाइ पाँचका लागि)

Eng. Ed. 411: General English I
Course No. : Eng. Ed. 411
Level: Bachelor
Semester: First

Program: BICTE
Nature of the course: Theoretical
Credit hours: 3
Teaching hours: 48

1. Course Description

This is a general English course designed to develop students' proficiency in grammar, academic vocabulary, reading and writing. The grammar component includes elements ranging from tenses to transformation. Vocabulary component covers words from different academic fields. The reading component deals with a wide variety of carefully selected materials that include informative passages on contemporary and critical issues. The writing component includes materials required for effective communication on matters of general and academic interests.

2. General Objectives

The general objectives of this course are as follows:

- To help students use grammatically correct English.
- To expand students' repertoire of general and academic vocabulary.
- To develop students' ability to comprehend and interpret different kinds of written texts.
- To enable them to compose different kinds of writings for effective communication on matters of general and academic interests.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Make sentences using appropriate tenses • Use modals and verbs correctly • Supply correct prepositions, adjectives and adverbs • Apply conditionals in the given contexts • Form words and sentences	**Unit I. Grammar (10)** 1.1. Tenses 1.2. Modals 1.3. Questions, multi-words, verbs and verb structures 1.4. Determiners and prepositions 1.5. Adjectives and adverbs 1.6. Passive and conditionals 1.7. Word formation and sentences
• Identify and use academic vocabulary in a given discourse. • Apply appropriate ways to enrich their academic vocabulary.	**Unit II: Vocabulary (8)** 2.1 Working with academic vocabulary 2.2 Word combinations 2.3 Vocabulary at academic institutions 2.4 Ways of talking about 2.5 Opinions and ideas 2.6 Functions 2.7 Reading and vocabulary 2.8 Reference

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

• Extract general idea from texts. • Find specific information in the text. • Answer questions for the details in the given text. • Read and make notes of the important points. • Draw inferences from varieties of reading texts. • Give opinions and express attitudes. • Interpret different types of texts. • Solve problems and puzzles	**Unit III: Reading** **(15)** 3.1 Determining co-references 3.2 Matching things 3.3 Understanding instructions 3.4 Unscrambling texts and anagrams 3.5 Scanning: locating and extracting information 3.6 Skimming: finding out main point and the central idea 3.7 Drawing inferences and implications 3.8 Assessing opinions and attitudes 3.9 Solving problems and puzzles
• Rewrite given texts in different forms. • Compose short and long texts in the given topics. • Maintain coherence and cohesion in writing. • Write letters, resumes, summaries, reports, news and essays.	**Unit IV: Writing** **(15)** 4.1 Rewriting: rephrasing and paraphrasing 4.2 Parallel writing 4.3 Completing a text 4.4 Organizing a text: sequencing instructions, ordering information and connecting ideas 4.5 Writing summaries 4.6 Writing letters: personal, official, business and job application 4.7 Writing curriculum vitae (resume) 4.8 Writing reports: events and news 4.9 Writing essays: descriptive, expository, narrative and argumentative

Note: The figures in the parentheses indicate the approximate teaching hours allotted to represented units.

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 Instructional Techniques

Following general techniques are suggested for the overall delivery of the course.

- Lecture
- Discussion
- Explanation
- Illustration
- Demonstration
- Quizzes
- Presentation

It is expected that students are fully engaged in the lesson and sessions are interactive while presenting the lesson.

4.2 Specific Instructional Techniques

Some specific techniques are suggested to ensure the active engagement of the students.

Unit I	Small group discussion for the various grammar elements, pair works to find out the rules of language, mini-projects to research the various grammar elements in the texts. Groups will present their work followed by teacher's feedback.
Unit II	Individual practice, small group discussion and pair work.
Unit III	Individual study, pair works for reading tasks and presentation.
Unit IV	Individual assignment on various writing tasks, small group discussion and presentation.

In addition to the techniques mentioned above, observation of an English language class where children with different abilities are studying followed by presentation is also encouraged in all the units.

5. Evaluation

5.1 Internal Evaluation 40%

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

- Attendance 05 Points
- Participation in learning activities 05 points
- First assignment/midterm exam 10 points
- Second assignment/assessment (1 or 2) 10 points
- Third assignment/assessment 10 points

Total **40 points**

5.2 External Evaluation (Final Examination) 60%

Examination Division, Office of the Dean, Faculty of Education will conduct final examination at the end of the semester. Types of questions and the points allocated for them are as follows:

- Objective type question (Multiple choice 10 × 1 10 points
- Short answer questions (6 questions with 2 OR × 5 points) 30 points
- Long answer questions (2 questions with 1 OR × 10) 20 points

Total **60 points**

6. Recommended Books and Reference Materials

Recommended Books

Awasthi, J. R. ,Bhattarai, G. R. & Rai, V.S. (eds.) (2015). English for new millennium. Kathmandu: Vidyarthi Publication. **(For units III to IV) (Lessons from 1 – 30: page 1 - 138)**

McCarthy, M. & O'De, F. (2009). *Academic Vocabulary in Use*. Delhi: Cambridge University Press. **(For unit II)**

Fiona, D. & wayne, R. (2011). *Active Grammar, Level 2.* Cambridge. Cambridge University Press. ***(for Unit I)***

Following Lessons have been selected from the book English for the New Millennium:

1) Unit I: Legend, Lore and Education
    a. Start of Kali Yuga
    b. The Mirror of Matsuyama
2) Unit II: Short Stores
    a. The three Dancing Goats
    b. The Necklace
    c. The Gift of the Magi
    d. The Library
    e. The Open Window
3) Unit III: Non Fictional/Factual Writings
    a. Decayed teeth
    b. Women's Empowerment and Identity
    c. The Strange Looking Man
    d. The Spanish Chruch
4) Unit IV: Essays
    a. College Teachers
    b. Non-Violence
    c. The Happy Man
5) Unit V: Interviews
    a. Nelson Mandel
6) Unit VI: One Act Plays
    a. The Passer-by
7) Unit VI: Memoir And Travel
    a. Stealing and Atonement
8) Unit VII: Journals
    a. Journal Writing-I
9) Unit IX: Novel Extract and Motion Picture
    a. The Alchemist
10) Unit X: Contemporary Topics
    a. Karl Marx
    b. Feminist Criticism
    c. Postmodernism
11) Unit XI: Poemsl
    a. A smile
    b. Ode to Tomatoes
    c. Do Not Say
    d. The Ballad of Dead Friend
    e. The Buddha's Wife
    f. Life is fine
    g. Punishment in Kindergarten
    h. Night of the Scorpion

Reference Materials

Hornby. A.S. (2010). Oxford Advanced Learner's Dictionary (8th Edition). Oxford: Oxford University Press.

Ed. 411: Fundamentals of Education

Course No. : Ed. 411
Level: Bachelor Degree
Semester: First

Nature of Course: Theoretical
Credit Hours: 3
Teaching hours: 48

1. Course Description

This course is designed to orient the students to theoretical and fundamental characteristics of education. It also deals with philosophical and sociological approaches to education. Similarly, it also covers educational thought of prominent educationists and recent trends of educational development in Nepal. It intends to develop an insight into the students in relation to bases of education focusing on interactive participation of both the students and teachers.

2. General Objectives

The course is designed with the following general objectives:

- To help students develop broader understanding on bases of education
- To familiarize the students with the approaches to education
- To assist the students to analyze the philosophical base of education within different schools of philosophy.
- To enhance the students' knowledge to analyze the sociological basis of education and identify its possible use in education.
- To acquaint the student with basic educational thought of prominent educationists.
- To make the students competent in reviewing the trends of educational development in Nepal at various periods.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Clarify the concept of education as a discipline • Describe the characteristics of discipline • Elaborate the meaning of education • Define and conceptualize education • Explain the forms/types of education • State the nature of education	**Unit I: (8(** Introduction to Education **1.1** Education as a discipline 1.1.1 Meaning of education as a discipline 1.1.2 Characteristics of discipline 1.2 Meaning of education 1.2.1 Etymological 1.2.2 Narrow 1.2.3 Broader 1.3 Definitions of education 1.4 Major forms/types of education 1.4.1 Informal

	1.4.2 Formal 1.4.3 Non-formal 1.5 Nature of education 1.5.1 Direct and indirect 1.5.2 Individual and collective 1.5.3 General and specific
• Explain the concept of approaches to education • Clarify concept of open and distance education and continuing education • State the process of open and distance learning • Elaborate needs of continuing education and skill-based and competency-based approaches to education • Draw implications of skill-based and competency-based approaches to education	**Unit: II Approaches to education (5)** 2.1 Open and distance learning 2.2.1 Concept 2.2.2 Process 2.2.3 Learning materials 2.2 Continuing education 2.2.1 Concept 2.2.2 Needs 2.3 Skill-based and competency-based approaches to education 2.3.1 Concept 2.3.2 Needs 2.3.3 Classroom implication
• Clarify concept, branches and functions of philosophy • Relate philosophy with education • Compare schools of philosophy in terms of its premises, objectives, curriculum , educative process, curriculum, role of teacher and student • Derive implications of philosophy of education for to-day's classroom teachers	**Unit III: Philosophical Perspectives on Education (14)** **1.3** Concept, branches and functions of philosophy **1.4** Relation between philosophy and education **1.5** Schools of philosophy: Philosophical premises, objectives of education, educative process, curriculum, role of teacher and student 1.5.1 Idealism 1.5.2 Naturalism 1.5.3 Realism 1.5.4 Pragmatism 3.4 Implications of schools of philosophy for classroom teachers
• Relate sociology with education • Describe concept and modes of socialization as a base of education • Illustrate the agencies of socialization • Explain concept and importance of social interaction as a base of education • Explain the patterns of social interaction as a base of education • Classify social interaction • Derive implications of sociological base of education for schools	**Unit IV: Sociological Bases of Education (8)** 4.1 Relation between sociology and education 4.2 Socialization as a base 4.2.1 Concept 4.2.2 Modes 4.3 Agencies of socialization 4.3.1 Active agencies 4.3.2 Passive agencies 4.4 Social interaction as a base 4.4.1 Concept and importance of social interaction 4.4.2 Patterns of social interaction 4.4.3 Classification

	4.6 Implications of sociological bases of education for school
• Explain eastern and western educational thought in relation to aims, curriculum and educative process	**Unit V: Educational thought: Aims, Curriculum and Educative Process (4)** 5.1 Eastern thought 5.2 Western thought
• Overview the trends of educational development in Nepal to identify the modern bases of education	**Unit VI: Trendsof Educational Development in Nepal (9)** 6.1 Nepal National Education Planning Commission (NNEPC) 2011 B.S 6.2 National Education System Plan (NESP) 2028 B.S 6.3 National Education Commission (NEC) 2049 B.S 6.4 School Sector Reform Plan (SSRP) to Post-SSRP (From access to quality) 6.5 Integrated approach to education (Special Needs Education, technical education)

Note: The figures in the parentheses indicate approximate teaching hours for respective units.

4 Instructional Techniques

The following modes of delivery can be used by the teacher as instructional strategies in the classroom.

4.3 General instructional strategies

- Lecture with the use of multimedia projector
- Discussion
- Question answer
- Brainstorming

4.4 Specific Instructional Techniques

The following techniques will be used for active participation of students in learning process:

Unit	Activity and Instructional Techniques
II	• Groups of students will visit educational institutions with open and distance learning (ODL) programme to identify their implementation procedures. The groups will prepare and present a brief report on implementation procedures of ODL programme in the class followed by discussion, and teachers' comments and suggestions. • Groups of students will prepare and present a comparative report on differences between skill-based and competency-based approaches to education, followed by discussion and suggestions
VI	Groups of students will study different reports ranging from NNEPC to post-SSRP to identify their milestones. Each of the groups will share the milestones (characteristic features) of these reports in the class.

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	10
• Second assignment	10
• Third assignment	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.

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

6. Recommended Books and Materials

Brubacher, J.S. (2007). *Modern philosophies of education.* New Delhi: Surjeet Publication Unit) (III

Crow, L.D & Alice Crow (1976). *Modern philosophies of education.* New Delhi: Eurasia Publishing House (Unit III)

Das, B.N. (1995). *Foundation of education: Thought and practice.* Calcutta: Kalyani Publication (Unit I, II & III)

Giddens, A. (2006). *Sociology* (5th ed.). Delhi: AITBS Publishers and Distributers (Unit IV)

Morris, I. (1972). *Sociology: An introduction.* London: George Allen & Unwin Publisher. (Unit IV)

Ornstein, A. C. & Levine, D.U. (1989). *Foundations of education* (4th ed.). USA: Houghton Mifflin Company. (Unit III)

Sen, P. (1996). *Axiomatic philosophy*. New Delhi: New Age International Publishers.(Unit III)

Ministry of Education (1971*). National education system plan (from 1971 to 1976)*. Kathmandu: Ministry of education (Unit VI)

NEC (1972). Report of national education commission. Kathmandu: Author (Unit VI)

NNEPC (1956). Education in Nepal: Report of NNEPC. Kathmandu: College of Education (Unit VI)

School sector reform plan. Kathmandu: Ministry of Education .)2009(Ministry of Education (Unit VI)

References

MoES (2003). Education in Nepal. Kathmandu : Planning Division, Statistics Section (Unit VI)

(B.S). Saikshaik suchana. Kathmandu: Ministry of Education (Unit VI 2072(Nepal Sarkar

प्राविधिक शिक्षा परिषद्को कार्यालय
कीर्तिपुर

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

ICT Ed. 415: Introduction to Information Technology

Course No: ICT Ed. 415 Nature of Course: Theoretical + Practical
Level: Bachelor Credit Hours: 3 (2T+1P)
Semester: First Teaching Hours: 64 (32T+32P)

1. Course Description

This course aims to provide the students with the foundation knowledge of contemporary Information Technology areas, software, applications and job skills required to enter the IT market. It covers a broad range of introductions to Information Technology concepts, operating systems, and office automation tools such as word processors, spreadsheets, databases and presentations. It also covers the telecommunication and computer network, internet, email, web and ethical issues in information technology.

2. Course Objectives

Following are the general objective of this course:

- To familiarize the students with computer and its applications in the relevant fields
- To enhance the skill of students in Information Communication and Technology (ICT) uses and operating system.
- To make the students competent in office automation system applications.
- To enable the students to use the Internet and www
- To make the students knowledgeable about telecommunication industries.
- To make the students able to use the computer system in a safe and secure way

3. Specific Objectives and Contents

Specific Objectives	Contents
• State scope and importance of IT • Differentiate a system from computer system in terms of characteristics, capabilities and limitations • Identify the types of computers and memory devices used in different generation • Identify basic components of a computer system • Distinguish between primary and secondary memories along the dimension of speed, cost and capacity.	**Unit 1 : Fundamentals of Computer (10T+2P)** 1.1 Computer system concepts, characteristics, capabilities and limitations 1.2 Generations of computers 1.3 Types of computers 1.4 Basic components of a computer system 1.4.1 Input devices 1.4.2 Output devices 1.4.3 CPU and its components 1.4.4 Memory: RAM, ROM, PROM, EPROM 1.4.5 Secondary storage device **Lab Work** • Demonstration of PC components • Prepared specification of PC system
• Explain concept of software along with its need • Differentiate main categories of computer software. • Explore the importance of programming languages in software development.	**Unit 2 : Computer Software (10T+5P)** 2.1 Types of Programming Language 2.2 Language Translators: Interpreter, Assembler, Compiler 2.3 Introduction to software 2.4 Types of software

• Analyze the trends of new software and mobile computing. • List all the major operating system • Illustrate file allocation table • Describe window operating system • Perform the window based operating system	2.3.1 System Software 2.3.2 Utility Software 2.3.3 Application Software 2.5 Operating System and its types 2.6 Data and Database Management 2.7 Introduction to Window Operating System 2.7.1 GUI environments 2.7.2 Working with Files & Folders 2.7.3 Working with windows application programs 2.7.4 Customizing the taskbar and desktops 2.7.5 Customizing windows 2.7.6 Use of accessories. 2.7.7 Working with control panel **Lab work** • Performing 2.5 activities using window based operating system
• Identify special features commonly found in modern word processor such as editing, formatting, mail merging etc. • Execute some financial formulas in spreadsheet. • Execute presentation program. • Create and format slides. • Design and animate the slide	**Unit 3: Office Automation Software (5T+20P)** **3.1 Word processor** **3.1.1** Creating and formatting documents **3.1.2** Managing page numbers, header and footer **3.1.3** Mail Merge **3.1.4** Printing documents **3.1.5** Track Changes in document **3.1.6** Inserting citation in APA **3.1.7** Generate Table of contents **3.2 Spreadsheet Application** **3.2.1** Creating, formatting and printing worksheets. **3.2.2** Using formulas to perform different calculations **3.2.3** Creating, formatting and printing graphs **3.3 Presentation Application** **3.3.1** Creating and saving presentations **3.3.2** Inserting multimedia content, hyperlink, slide number, date and time **3.3.3** Animation and Transitions **3.3.4** Using Master Slide **3.3.5** Slide printing **Lab Work** • Performing the word processing activities using office automation software like MS Word • Performing the spread sheet activities using Office automation software like MS Excel • Performing the presentation activities using Office automation software like MS Power Point

• Describe computer network and its types • Identify topologies commonly used in networks. • Describe communication media • Illustrate different network components.	**UNIT 4: Network** **(8)** 4.1 Introduction of computer network 4.2 Types of Network - LAN, WAN, MAN, PAN 4.3 Topologies of LAN - Ring, Bus, Star, Mesh and Tree topologies 4.4 Communication Media - Twisted, Coaxial, and Fiber Optic 4.5 Cellular Network : 2G, 2.5G, 3G, 4G, 5G
• Explain evolution of internet and world wide web • Distinguish between internet, intranet and extranet • Demonstrate the use of web technology • Describe social media and e-mail services • Explain cloud, green and virtual computing • State different e-Services • Surf web sites, use search engine, create e-mail and use social media	**Unit 5: Internet and Web** **(10T+2P)** 5.1 Internet and Its Evolution 5.2 World Wide Web 5.3 Internet, Intranets and Extranet 5.4 Web Services: social media, e-Mail, video on demand 5.5 Cloud Computing 5.6 Green Computing 5.7 Autonomic Computing 5.8 e-Services • e-business • e-learning • e-Governance • e-resources **Lab work** • Surfing web sites • Using Search engine • Creating Email • Using social media
• Define computer virus and threats • Explain the ways of protecting computer virus • Identify the security and ethical issues in IT. • State computer crime • Install antivirus and scan computer system	**Unit 6 : Security and Ethical Challenges** **(5T+3P)** 6.1 Computer Virus and threats 6.2 Cyber Crime and its types 6.3 Security and Control 6.4 Ethical issues in Information Technology **Lab Work** • Installing antivirus and scan computer system

Note: The figures in the parentheses indicate the approximate teaching hours for the respective units.

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 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. The details of suggested instructional techniques are presented below:

Units	Activities
Unit 2: For Window Operating System	• Demonstration by the teacher on different types of operation system (Working with files & folders, working with windows application programs, customizing the taskbar and desktops, customizing windows, use of accessories and working with control panel) • Individual lab work of those operation system by each student • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 3: For Word Processing	• Demonstration by the teacher on word processing - Formatting text - editing document - tab setting, - paragraph alignment - inserting table and objects - managing table of contents, page setup, proof reading the document • Lab work in pairs in a task assigned by the teacher using word processing • Monitoring of students' work by reaching each pair and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 3: For Spread Sheet	**Spread Sheet** • Demonstration by the teacher on spread sheet - Naming cell and cell range, use of formula and different types of functions - Inserting chart and objects - Renaming worksheet and workbook - Handling cell formatting such as alignment, numbers, currency, font colour, merger and centre - Applying autofill features to customise tasks - Design a bill of supermarket, mark sheet of school and college, mark ledger book, line graph, column chart, pie chart, 3D view chart using title, Axis, Gridlines, Legend, Data level and data table

	- Develop different types of tables - Use different types of functions, Formulas and subtotals. - Use colours, Font, Currency, Subtotal, Sort, Auto filter, etc. • Lab work in pairs in different tasks assigned by the teacher • Monitoring of students' work by reaching each pair and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 3: For Presentation Package	• Demonstration by the teacher on presentation package - Create different types of presentation slides - Apply a design temples - Use formatting, Alignments, Bullet, Insert picture, Organization charts, Word Art, Diagram Gallery display box, 3-D style, Rotating objected. Create/types of charts and Data sheet. Chart with title, Axis, Gridlines, Legend, Data labels and data table - Insert the different types of custom animation and movie. - Create different type of slides to use in the teaching and learning process • Individual lab work of those operation system by each student • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 6: For Data Management System	• Demonstration by the teacher about creating and maintaining the database using MS-Access. • Pair works to design a database using DDL and DML commands for creating Students and staffs profile, Telephone Directory Etc. • Monitoring of students' work by reaching each pair and assist them to complete the assignment • Presentation by students followed by peers' comments and teacher's feedback
Unit 5: For E-Mail	• Demonstration by the teacher on - creating a mailing list for communicating students or teachers - using e-mail to search to download and to send; to receive, to attach file and to send copies of e-mail documents. • Individual lab work of those operation system by each student • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 5: For Internet	• Demonstration by the teacher on searching the web site, downloading the file, uploading the files, and creating a block • Individual lab work of those operation system by each student • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback

5. Evaluation

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

Internal Assessment Theory	Internal Assessment Practical	Semester Examination (Theoretical exam)	External Practical Exam/Viva	Total Points
25 Points	15 Points	40 Points	20 Points	100 Points

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

5.1 Internal Assessment (25 Points) of theoretical part

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

Attendance and learning Activities	5 points
First assignment (Written assignment)	5 points
Second assignment (Project work with presentation)	10 points
Third assignment/written examination	5 point
Total	25 points

5.2 Internal Assessment (15 Points) of practical part

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

Attendance and learning Activities	5 points
Practical work/project work/lab work	10 points
Total	15 points

5.3 Semester Examination (60 Points)

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

Objective question (Multiple choice questions 10 x 1 point)	10 Points
Subjective Questions (6 questions with 2 OR x 5 marks)	30 Points
Total	40 points

5.4 Practical Exam/Viva (20 Points)

Examination Division, Office of the Dean will appoint an external examiner (ICT teachers working another campus) for conducting practical examination

Items	Points
Evaluation of Record Book	4
Project work/practical work presentation/skill test	10
Viva	6
Total	20

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

Alexis Leon & Mathews Leon (2009). Fundamentals of information technology, 2/e. New Delhi. Vikas Publishing House (Unit 1)

Turban, R. R. (2014). *Introduction to information technology.* John Wiley and Sons (Asia) Pvt. Ltd. (For UNIT VI to UNIT IX)

Morley, D. &. (2013). *Understanding computers today and tomorrow.* Cangage Learning.

Sinha, P. K., & Sinha, P. (2007). Computer fundamentals: Concepts, systems & applications. New Delhi: BPB Publications.

Norton, P. (2006). Peter Norton's computing fundamentals. Boston, Mass: McGraw-Hill Technology Education.

V. Rajaraman, Neeharika Adabala (2014).Fundamentals of computers 6th Edition. New Delhi: PHI

Cox, J., Lambert, J., & Frye, C. (2011). *Microsoft Office Professional 2010 step by step.* Redmond, Wash: Microsoft.

Melton, B. (Ed.). (2013). *Microsoft Office Professional 2013*. Sebastopol, Calif: O'Reilly Media.

Melton, Beth, Dodge, Mark. (2013). Microsoft Office Home and Student 2013 Step By Step. India: PHI

Patrice-Anne Rutledge. (2014),Office 2013 All-In-One Absolute Beginner's Guide ISBN:9789332539372, Pearson India

ICT. Ed. 416: Programming Concept with C
Course No. : ICT. Ed. 416
Level: Bachelor
Semester: First

Program: **BICTE**
Nature of course: Theoretical + Practical
Credit hours: 3 (1T+2P)
Teaching hours: 80 (16T+64P)

1. Course Description

The aim of the course is to impart knowledge of the basic concepts of procedural programming and to help the students build skills for solving problems using procedural programming paradigm. It provides the students with the basic features of the language such as data types, operators, control structure, array, functions, structure, pointer and file handling which are the common features of any programming languages. Students are more engaged in laboratory work to exaction of programing experiments rather than theoretical concept.

2. General Objectives of the Course

Following are the general objective of this course:

- To make the student knowledgeable about the procedural programming concept.
- To enable the student in implement the essential programming concepts and methods in practices.
- To explore the programming execution procedure compiler, memory and library.
- To provide the students with the skills of application to solve the real world problems.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Give an introduction of programming language • Describe assembler, compiler and interpreter • State syntax and semantics • Explain programming design tools • Identify the features of good programme • Design algorithm and draw diagram of flow chart of sequence, decision making and repetition concept of programming	**Unit 1: Introduction to Programming Concept (2T+4P)** 1.1 Introduction of Programming Language 1.2 Assembler, Compiler and Interpreter 1.3 Syntax and Semantics 1.4 Programming Design Tools 1.4.1 Algorithm 1.4.2 Flow chart 1.4.3 Pseudo codes **Lab Works** • Designing algorithm and draw flow chart for sequence, decision making and repetition concept of general programming.
• Outline historical development of C programming language. • Describe basic structure of C program, character set, token and comments, variables and constants. • Apply data types and	**Unit 2: Introduction to C (5T+5P)** 2.1 History of C Language 2.2 Basic Structure of C Program 2.3 Escape Sequence 2.4 Comment 2.5 Variables and Constants 2.6 Storage classes in C

conversion in program. • Outline input and output in relation to C • Apply operators and operands in program.	2.7 Data Types 2.8 typedef keyword 2.9 Enumeration 2.10 Format Specifiers 2.11 Type Conversion 2.12 Formatted and unformatted I/O functions 2.13 Operators 2.13.1 Arithmetic 2.13.2 Relational 2.13.3 Logical 2.13.4 Assignment 2.13.5 Conditional operator (?:) **Lab Works** • Developing basic structure of C program. • Declaring and assigning variables and constants. • Applying I/O functions • Using operators and type casting
• Write decision making problems using if, switch, goto, break and continue statements • Apply loop concept in program.	**Unit 3: Control Statements in C** **(4T+10P)** 4. if statement 5. switch statement 6. goto statement 7. break statement 8. continue statement 9. Loop statement 1. while 2. do-while 3. for 10. Nested loop 11. Infinite loop **Practical Works** • Apply if, switch, goto, break and continue statements • Use all types of loop statements to solve meaningful problems. • Create different patterns using nested loop
• Generate the program using 1D array and 2D array. • Solve simple computing problems using array.	**Unit 4: Array and String** **(5T+7P)** 4.1 Introduction to Array 4.2 Declare, access and initialize array/ array elements. 4.3 Multi-dimensional array 4.4 Application of array (searching, matrix addition, subtraction.

• Use different string functions to manipulate strings.	multiplication, transpose of matrix, sorting, finding greatest & smallest value in the list etc.) 4.5 Character Array and String 4.6 String Manipulation functions: strlen, strcpy, strcat, strcmp, strrev **Practical Works** • Array declaration, definition and initialization. • Creating a single or multi-dimensional array. • Write program to apply 2D array and 1D array • Using string manipulation functions
• Create a program to bind heterogeneous data • Apply the array of structure concept to collect large no of records in structure • Differentiate between union and structure	**Unit 5: Structure in C** **(3T+5P)** 5.1 Concept of Structure 5.2 Initializing, accessing member of structure 5.3 Array of Structure 5.4 Nested Structure 5.5 Union **Practical Works** • Binding different types of data in structure • Creating union data types.
• Demonstrate pointer and address references. • Apply pointer in array • Identify relationship among pointer, array and structure • Know to allocate memory dynamically	**Unit 6: Pointer** **(3T+7P)** 6.1 Pointer variable introduction 6.2 Address of operator (&) and indirection operator (*) 6.3 Pointer Arithmetic 6.4 Relationship between 1D Array and Pointer 6.5 Dynamic Memory Allocation (malloc, calloc, realloc and free) 6.6 Pointer and Structure **Practical Works** • Using pointer to dereference. • Illustrate the relationship between array and pointer, structure and pointer • Allocate memory dynamically using allocation functions • Using different string function in program.
• Clarify the concept of functions. • Create function with different parameter passing methods.	**Unit 7: Function** **(5T+5P)** 7.1 Function introduction 7.2 Creating and using user defined function 7.3 Passing Parameters/arguments 7.4 Returning value from function 7.5 Pointer and Function 7.6 Arguments and return type of main function 7.7 Command line arguments **Practical Works**

	• Prototype, call and define function • Pass the parameters and return values from function • Identify and demonstrate call by reference and call by value concept in function. • Use arguments of main function to pass arguments from command line interface
• Define the concept the file handling in C. • To apply file access methods. • Applying different formatted and unformatted I/O functions	**Unit 8: File Handling** **(5T+5P)** 7.1 Concept of File 7.2 File access methods: Sequential and Random 7.3 File Opening Modes (r, w, a, r+, w+, a+) 7.4 Closing and Opening files 7.5 File I/O Functions: fprintf, fscanf, fgets, fputs, fgetc, fputc, getc, putc, getw, putw, fread, fwrite 7.6 Random access to file: fseek, ftell, rewind 7.7 Deleting File **Practical Works** • Creating file handling application for open, read, write and appends. • Accessing files sequentially and randomly.

Note: The figures in parenthesis indicate approximate teaching hours allotted to respective units.

4. Instructional techniques

4.1 General Instructional Techniques

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. The details of suggested instructional techniques are presented below:

Units	Activities
Unit 1	• Demonstration by the teacher on drawing different types of algorithm, flowchart and pseudo codes • Individual lab work by each student • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 2 to 7	• Demonstration by the teacher on project works mentioned in

	each unit • Lab work individually or in pairs in tasks assigned by the teacher • Monitoring of students' work by reaching each individual or pair and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Practical Work Assignment	• Demonstration by the teacher on simple application with input process and store in notepad using C • Lab work individually or in pairs in tasks assigned by the teacher • Monitoring of students' work by reaching each individual or pair and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's

5. Evaluation

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

Internal Assessment Theory	Internal Assessment Practical	Semester Examination (Theoretical exam)	External Practical Exam/Viva	Total Points
25 Points	15 Points	40 Points	20 Points	100 Points

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

5.1 Internal Assessment (25 Points) of theoretical part

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

Attendance and learning Activities	5 points
First assignment (Written assignment)	5 points
Second assignment (Project work with presentation)	10 points
Third assignment/written examination	5 point
Total	25 points

5.2 Internal Assessment (15 Points) of practical part

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

Attendance and learning Activities	5 points
Practical work/project work/lab work	10 points
Total	15 points

5.3 Semester Examination (60 Points)

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

Objective question (Multiple choice questions 10 x 1 point)	10 Points
Subjective Questions (6 questions x 5 marks With "OR" two questions)	30 Points
Total	40 points

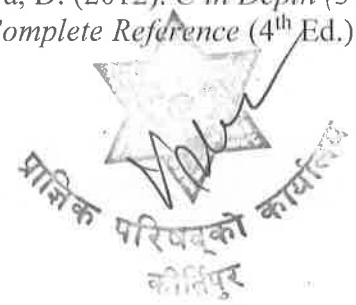
5.4 **Practical Exam/Viva (20 Points)**

Examination Division, Office of the Dean will appoint an external examiner (ICT teachers working another campus) for conducting practical examination

Items	Points
Evaluation of Record Book	4
Project work/practical work presentation/skill test	10
Viva	6
Total	20

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

Srivastava, S.K. & Srivastava, D. (2012). *C in Depth (*3rd Ed). New Delhi: BPB Publication
Schildt, H. (2017). *C: The Complete Reference* (4th Ed.). MC Graw Hill



Math Ed. 416: Mathematics-I
Level: Bachelor Degree
Code Number: Math Ed. 416
Semester: First

Nature of Course: Theory
Teaching Hours: 48
Full Marks: 100
Credit Hours: 3

1. Course Introduction

This is an integrated course of different branches of mathematics for the students at bachelor's degree students of Information and Communication Technology (BICTE). This course provides a foundation for the students to understand the basic concept of mathematics to be applicable in the field of technology. This course starts from the very fundamental matters of set and logic which help to understand various concepts of mathematics. Furthermore, it introduces real number system to make students familiar with real number system and its properties without which mathematical study is not complete. This course also enables to develop skills of drawing graphs of different types of functions that help to understand mathematics through figures. Finally, it discusses on sequence, series and logarithms through subsequent units which provide necessary concepts of basic mathematics to be applicable in the field of information and communication technology.

2. General Objectives

The general objectives of this course are as follows:

- To familiarize the students with the basic concepts and operations of set theory.
- To enhance the knowledge of the logic to test validity of the arguments.
- To acquire the concept of real number system.
- To inculcate the skills of drawing graphs of functions and inequalities.
- To develop an skill of solving quadratic equations and deal on the relation between roots
- To familiarize students with sequence and series
- .To acquire a knowledge of logarithm and its properties

3. Specific Objectives and Contents

Specific objectives to each unit and corresponding contents are described below:

Objectives	Contents
• Define sets and their types with examples. • Identify and illustrate sets and their subsets • Explain the relation of sets and subsets • Perform basic set operations with examples • Find cardinal number of sets. • Prove algebra of sets and illustrate with examples. • Represent sets in Venn-diagrams.	**Unit I Sets (6)** 1.1.Sets and their types 1.2.Relation of sets and representation 1.3Operations on sets with their properties 1.4.Cardinal number of sets 1.5.Algebra of sets 1.6. Venn diagram of sets
• Define statements and their truth values • Identify different types of connectives • Forming compound statements using	**Unit II Symbolic Logic(5)** 2.1 Statements 2.2 Logical Connectives

different types of connectives • Construct negation of different types of statements • Draw truth values of compound statements • Identify tautology and contradiction of statements • Test validity of arguments by truth tables • Test validity of arguments using Euler diagrams	2.3 Compound statements and their truth values 2.4. Algebra of statements 2.5 Equivalent statements 2.6 Conditional and bi-conditional statements 2.7 Tautology and contradictions 2.8 Arguments and the test of their validity 2.9 Testing validity by Euler diagrams
• Identify the system of natural numbers ,whole numbers and integers • Describe the axioms of Peano on natural numbers • Define rational and irrational numbers • Plot rational and irrational numbers in graph • Deal with addition ,multiplication and distributive properties of real numbers • Define order properties of real numbers • Explain density property of rational an irrational numbers • Explain absolute and non-absolute values of real numbers	**Unit III Real Number System (7)** 3.1Natural numbers ,whole numbers and integers 3.2 Peano's axioms of natural numbers 3.3 Rational and irrational numbers 3.4 Construction of rational and irrational numbers in a real line 3.5 Real numbers and its properties : • Addition property • Multiplication property • Distributive property • Density property 3..6 Absolute value of real numbers
• Define order pair ,Cartesian product and relation • Define and identify the types of mapping • Define and illustrate function its domain ,range and co-domain • Find composite and inverse of functions • Identify algebraic and transcendental functions • Draw graph of $y=\sqrt{x}$ • Define quadratic function and draw its graph • Define simultaneous equations of first degree and draw their graph	**Unit IV Functions and Graphs (6)** 4.1.Order pair , Cartesian product and relation 4.2. Mapping and its types • One to one • Onto • One to one and onto 4.3.Function : • Domain , • Range • Co-domain 4.4. Composite and inverse functions 4.5.Algebraic and transcendental functions 4.6 General form of quadratic function and its graph 4.7.Graph of function $y=\sqrt{x}$ 4.8.System of simultaneous equations and their graphs
• Distinguish between equations and inequalities • Identify linear and quadratic equations • Solve linear and quadratic equations	**Unit V Equations and Inequalities (10)** 5.1 Introduction to equation and inequalities 5.2 Roots of linear and quadratic equations

• Solve simultaneous equations of two variables of first degree • State properties of inequalities • Draw graph of inequalities of one and two variables • Find the solution set of inequalities of two variables • Solve linear programming problems by graphical method	5.3 System of first degree equations of two variables 5.4 Roots of linear inequalities of one variable 5.5 Inequalities and their properties 5.6 Graph of inequalities of one and two variables and their solution set 5.7 Solution of linear programming problems by graphical method
• Define finite and infinite sequence and series • Identify and illustrate arithmetic ,geometric and harmonic progressions • Find different types of means • Calculate sum of arithmetic and geometric series • Deal on properties of arithmetic and geometric means • Derive relation between AM,GM and HM	**Unit VI Sequences and Series (9)** 6.1 Finite and infinite sequences and series 6.2 Arithmetic, Geometric and Harmonic progressions 6.3 Arithmetic , Geometric and Harmonic means 6.4.Sum of arithmetic and geometric series 6.5 Properties of arithmetic and geometric means 6.6 Relation between means
• Define logarithm. • Prove properties of logarithm • Use properties of logarithm in solving numerical problems • Solve numerical problems related to characteristics and mantissa • Sketch the graph of exponential and logarithmic functions	**Unit VII Logarithms (5)** 7.1 Definition 7.2 Properties of logarithm 7.3Change of base 7.4 Characteristics and mantissa of logarithms 7.5 Computation with logarithms 7.6 Graph of exponential and logarithmic functions

4. Instructional Techniques

4.1General Instructional Techniques: There are various techniques of teaching and learning so as to grasp the knowledge of mathematics. Although the methods of teaching and learning may differ, the techniques to be used are lecture, discussion, problem solving, inquiry, question answer, demonstration, collaborative teaching approach and problem solving method.

4.2 Specific Instructional Techniques

The specific teaching and learning techniques (unit - wise) are listed below:

Units	Activities and Instructional Techniques	Teaching Hours (48)

Sets	Discussion and sharing experiences	6
Logic	Project work in group	5
Real Number System	Problem based learning in group	7
Functions and Graphs	Question answer and discussion in group	6
Equations and inequalities	Assignment and discussion	10
Sequence and series	Project work in group and individual and problem solving	9
Logarithm	Discussion and problem solving	5

5. Evaluation

5.1 Internal Evaluation: (40%)

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

- Attendance 5 marks
- Participation in learning activities 5 marks
- First assignment 10 marks
- Second assignment 10 marks
- Third assignment 10 marks

Total 40 marks

5.2 External Evaluation (60%)

The examination section of Dean Office , Faculty of Education will conduct final examination at the end of the first semester .The type of questions and marks allocated for each question will be as follows :

- Objective questions (multiple choice) 10 x 1 mark = 10 marks
- Short answer questions (with two or) 6 x 5 marks = 30 marks
- Long answer questions (with 1 or) 2 x 10 marks = 20 marks

Total = 60 marks

6. Reference Books

Bajracharya P. M, Basnet G. B., & Phulara, K. R.(2012) *Fundamentals of mathematics*. Kathmandu: Buddha Academic Publishers & Distributors Pvt Ltd.

Baranov I, Bogatyrev G & Bokovner O.(1985). *Mathematics for pre-college students*, Moscow: Mir Publishers

Bajracharya P., Basnet G.B. and Phulara K.R.(2011).*Fundamentals of mathematics* . Kathmandu : Buddha Academic Publishers and Distributers Pvt Ltd

Das, B.C. & Mukherjee B.N. (1984). *Higher trigonometry*. Calcutta: UN Dhur and Sons.

Ganguli, S.M &Mukh:erjee, B.N. (1993). *Intermediate algebra*. Calcutta: UN Dhur and Sons Pvt Ltd.

Pandit, R. P (2004) *Modern mathematics*. Kathmandu: Mrs Indira Pandit shantinagar.

Sarkar, S.K. (2013). A Textbook of *Descrete mathematics*. New Delhi: S Chand & Company Ltd Ramnagar.

Shrestha, R.M.&Bajracharya, S. (2062 B.S.). *Elementary modern linear algebra*. Kathmandu: SukundaPustakBhawan.

BACHELOR OF INFORMATION AND COMMUNICATION TECHNOLOGY EDUCATION (BICTE)

Curriculum

Second Semester

List of Subjects

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

Course title: Developmental Psychology

Course No. : Ed 422 Nature of Course: Theoretical
Level: B.Ed. Credit Hours: 3
Semester: Second Teaching hours: 48

---

1. Introduction

This course deals with human growth and development with the aim of providing students with concept, knowledge and understanding about child growth and development. In general, the course focuses on characteristics, developmental tasks and hazards of different stages of human life with their implications in education. In particular, this course provides students with specific concept, knowledge and understanding about the puberty and adolescence. The course focuses on the characteristics, developmental tasks, spurt of growth and development, social, mental and emotional developments, happiness and unhappiness during puberty and adolescence. In addition, this course provides students with understanding about guidance and counseling as measures to deal with the problems during adolescence.

2. General Objectives

The general objectives of this course are:

- To provide students with general understanding about babyhood, early and late childhood, adulthood and their characteristics, and developmental task, as well as their educational implications.
- To familiarize with puberty and adolescence and to equip them with broader concept, knowledge, attitudes and understanding on the puberty and adolescence.
- To enable students to explore contextual problems during adolescence, and suggests measures in line with the nature of the problems.

3. Specific Objectives and Contents

Specific Objectives	Contents
• To develop broader understanding of human growth and development. • To grasp the major determinants of human growth and development. • To explore the reasons for studying human growth and development. • To be acquainted with major methods of studying human	**Unit I:** Human growth and development. **(10 hrs.)** 1.1.Concept of human growth and development. 1.2.Determinants of human growth and development 1.3.Need for studying human growth and development in education. 1.4.Major methods of studying human growth development. 1.4.1. Cross-sectional, longitudinal, and case study 1.5.Major issues in human development 1.5.1. Nature vs. nurture

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

growth and development • To identify major issues in human development	1.5.2. Stability vs. change 1.5.3. Continuity vs. discontinuity
• To provide overview of various stages of human growth and development. • To explain developmental tasks and characteristics. • To discuss the potential hazards of all developmental stages.	**Unit II:** Developmental stages and characteristics **(8)** 1.6. Infancy and Babyhood: characteristics, developmental tasks and hazards. 1.7. Early and late childhood: characteristics, developmental tasks and hazards. 1.8.Puberty and adolescence: characteristics and developmental tasks 1.9.Adulthood (early, middle and late): characteristics and hazards.
• To broaden the knowledge and understanding on puberty. • To explain developmental tasks, skills, hobby and point out the potent hazards. • to explore the criteria, causes and effects of puberty. • To discuss the physical, mental, and emotional characteristics of puberty. • To explore educational implications for enhancing learning.	Unit III: Understanding puberty (10) 3.1 Developmental tasks, skills, hobby and possible hazards. 3.2 Causes, criteria and effects of puberty 3.3 Physical development: Spurt of growth during puberty. 3.4 Social development, entertainment and recreation. 3.5 Emotional development and its effects 3.6 Happiness and unhappiness during puberty 3.7 Ways of controlling unhappiness. 3.8 Educational Implications
• To develop wider perspectives on adolescence. • To explain developmental task, skills, hobbies, and potent hazards during adolescence. • To be familiar with physical, social, emotional, mental, moral characteristics and to explore their educational implications. • To identify the responsible factors for happiness and unhappiness during adolescence. • To be familiar with the career choice, interest and future orientation.	**Unit IV** Adolescence and developmental characteristics **(10)** 4.1 Developmental tasks, skills, hobbies and potent hazards 4.2 Physical characteristics and educational implication. 4.3 Social characteristics, leadership and educational implication. 4.4 Emotional characteristics and educational implication. 4.5 Mental characteristics and educational implication. 4.6 Morality during adolescence and educational implication. 4.7 Happiness and unhappiness during adolescence. 4.8 Career choice, interest and future orientation.
• To be aware of different problems during adolescence.	**Unit V** Adolescence and understanding problems **(10)** 5.1 Adolescence and drug abuse, alcoholism and

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

• To identify measures to deal with the problems during adolescence and draw their educational implications.	effects 5.2 Adolescence and sex, HIV/AIDs, sexually transmitted disease and effects. 5.3 Adolescence and social violence and conflict 5.4 Adolescence: frustration and Suicide 5.5 Guidance and counseling, psychotherapy, rehabilitation and family adjustment. .5.6 Educational implications

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 specific units.

4.1 General Instructional Techniques

- Lecture
- discussion
- Question answer

4.2 Specific Instructional Techniques

Unit	Suggested specific Instructional Techniques
III and IV	Students will be divided into groups and given different topics of III and IV units. Students will visit the schools for group work based on the topics assigned. Groups will prepare report and share in the class. Presentation will be followed by discussion and suggestions.
V	Students will be divided into different groups and assigned to collect issues and problems faced and created by the students at any school. They will prepare the report and present it in the classroom.

5. Evaluation

5.1 Internal Evaluation 40%

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

1) Attendance	5
2) Class participation	5
3) First assignment	10
4) Second assignment	10
5) Third assignment	10
Total	40

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

5.2 Final/Semester Evaluation 60%

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

1)	Objective type question (Multiple choice 10 x 1ponts)	10
2)	Short answer questions (6 questions with 2 OR x 5 points)	30
3)	Long answer questions (2 questions with 1 OR x 10 points)	20
	Total	60

Recommended Books

Baron, R. (2005). *Psychology.* India: Pearson Education.

Chauhan S.S. (1992), Advance Educational Psychology Jurjact, Publication, New Delhi, Vikash Publication

Hurlock E.B. (2002). *Developmental Psychology, A life span approach.* Tata MC Graw Hill Publishing Company Pvt.

Hurlock E.B. (1972), Child development, Tata MC Graw Hill

Jersild, A. T., Telfor, C. W., & Sawrey, J.M. (1997). *Child Psychology.* Neew Delhi: Prentice Hall.

Rogers, D. (1972). *The Psychology of Adolescence.* NJ: Appleton-Century-Crofts.

Santrock, J. W. (2007). *Adolescence.* New Delhi: Tata McGraw-Hill Publishing Company LTD

References

Aryal, P. N. & Bhattarai, D.P. (2009). *Educational Psychology.* Kathmandu: Quest Publication

Battarai, H. (2073BS). *Shikshya Manobigyan.* Kathmandu: Ratna Pustak,

Bidari, B. P. (2073BS). *Shikshya Manobigyan.*Kathmandu: Pinakal

Gibson, R.L. & Mitchell, M.H. (2005). Introduction to counseling, and guidance.NY: Randow House.

Grace, J. C. (1976). *Developmental Psychology.* India: Pearson Education.

Paudel, G. ( ). *Shikshya Manobigyan.* Kathmandu:

Pokhrel, M.M. (2073 BS), *Shikshya Monobigyan.* Ashish Book House, Bagbazar, Kathmand

ने.शि.४२१ : साधारण नेपाली-२
पाठ्यांश सङ्केत : ने.शि.४२१
तह : बि.एड.
सेमेस्टर : दोस्रो

पाठ्यांश प्रकृति : सैद्धान्तिक
क्रेडिट आवर : ३
शिक्षण घण्टा: ४८

१. पाठ्यांशको परिचय

यस पाठ्यांशले नेपाली भाषामा विशिष्ट बोध, अभिव्यक्ति र रचना कौशलको विकास गर्ने लक्ष्य राखेको छ । यो पाठ्यांश जम्मा पाँच एकाइमा विभाजित छ । पहिलो एकाइमा वाक्यतत्त्व, वाक्यान्तरण र संसक्ति; दोस्रो एकाइमा सूचना र तथ्यको रूपान्तर; तेस्रो एकाइमा प्रयोजनपरक बोध; चौथो एकाइमा लिखित अभिव्यक्ति र पाँचौ एकाइमा साहित्यिक कृतिको पठन, आस्वादन र प्रतिक्रियात्मक लेखन जस्ता विषयवस्तुहरू समावेश गरिएका छन् । त्यसैले यसमा वाक्यतत्त्व, वाक्यान्तरण र संसक्ति, सूचना र तथ्यको रूपान्तर, प्रयोजनपरक बोध तथा विभिन्न प्रकारका लिखित अभिव्यक्तिका साथै निर्धारित साहित्यिक कृतिहरूको पठन, आस्वादन र अभिव्यक्ति क्षमताको विकास गराउने अपेक्षा राखिएको छ ।

२. साधारण उद्देश्यहरू

यस पाठ्यांशका साधारण उद्देश्यहरू निम्नानुसार रहेका छन् :

- निर्धारित वाक्यतत्त्वका आधारमा स्वतन्त्र र निर्देशित रचना लेख्न सक्षम तुल्याउने,
- शब्दहरूका व्याकरणिक र कोशीय संसक्ति तथा अन्तर्वाक्यात्मक अन्विति पत्ता लगाउन प्रोत्साहित गराउने,
- अनुच्छेदका सूचना/तथ्यलाई तालिका र चित्राकृतिमा रूपान्तर गर्न सबल बनाउने,
- निर्धारित गद्यांशबाट प्रयोजनपरक बोध प्रश्नको उत्तर लेखनको अभ्यासमा दक्ष तुल्याउने,
- विभिन्न प्रकारका लिखित अभिव्यक्ति सिर्जनामा सक्रियता बढाउने,
- निर्दिष्ट साहित्यिक विधाको सरसरती पठन, आस्वादन र प्रतिक्रिया लेखनको अभ्यास गराउने ।

३. विशिष्ट उद्देश्य र पाठ्यवस्तु

विशिष्ट उद्देश्य	पाठ्यवस्तु
• वाक्यतत्त्व अनुरूप वर्णनात्मक प्रकृतिका स्वतन्त्र अनुच्छेद रचना गर्न, • निर्देशित वाक्यतत्त्व अनुरूप वाक्यान्तरण गर्न, • निर्देशित संरचनाअनुसार वाक्य संश्लेषण र विश्लेषण गर्न, • शब्दहरूका व्याकरणिक र कोशीय संसक्ति पहिल्याउन, • अन्तर्वाक्यात्मक अर्थान्विति पत्ता लगाउन ।	**एकाइ एक : वाक्यतत्त्व, वाक्यान्तरण र संसक्ति** (१२) १.१ काल, पक्ष, भाव, वाच्य र करणका आधारमा स्वतन्त्र रचना १.२ काल, पक्ष, भाव, वाच्य, प्रेरणार्थ, करण र उक्ति परिवर्तनका आधारमा वाक्यान्तरण १.३ वाक्य संश्लेषण र विश्लेषण १.४ व्याकरणिक संसक्ति १.५ कोशीय संसक्ति
• अनुच्छेदका सूचना र तथ्यलाई वृत्ताकार, स्तम्भ, रेखाचित्र र आरेखमा रूपान्तर गर्न ।	**एकाइ दुई : सूचना र तथ्यको रूपान्तर** (६) २.१ अनुच्छेदमा प्रस्तुत सूचना र तथ्यलाई तालिका वा चित्राकृति (वृत्ताकार, स्तम्भ) मा रूपान्तर २.२ अनुच्छेदमा प्रस्तुत सूचना र तथ्यलाई रेखाचित्र र आरेखमा रूपान्तर
• नेपाली वाङ्मयका विभिन्न विषयक्षेत्रसँग	**एकाइ तिन : प्रयोजनपरक बोध** (११)

सम्बन्धित बोधात्मक प्रश्नको उत्तर दिन , • विभिन्न क्षेत्रसँग सम्बन्धित सामान्य तथा विशिष्ट दृष्टांश र अदृष्टांशमा आधारित तथ्यपरक, निष्कर्षपरक, अनुमानपरक, तुलनात्मक, व्याख्यात्मक, कार्यकारणात्मक, बोध प्रश्नको उत्तर लेखन गर्न ।	३.१ पठनबोध ३.१.१ नेपाली वाङ्मयका विविध क्षेत्र र विषयसँग सम्बन्धित सामान्य र विशिष्ट बोध प्रश्नहरूको उत्तर लेखन र प्रस्तुति • भाषा, • साहित्य, • शिक्षा, • भूगोल, • कृषि, • अर्थवाणिज्य, • सूचना तथा सञ्चार, • मनोविज्ञान, • समाज, • संस्कृति, • दर्शन, • विज्ञान तथा प्रविधि • स्वास्थ्य • वातावरण, • कानुन, • खेलकुद ३.१.२ सामान्य तथा विशिष्ट प्रकृतिका दृष्टांश र अदृष्टांशमा आधारित तथ्यपरक, निष्कर्षपरक, अनुमानपरक, तुलनात्मक, व्याख्यात्मक, कार्यकारणात्मक, बोध प्रश्नको उत्तर लेखन र प्रस्तुति
• निर्देशित र स्वतन्त्र अनुच्छेद रचना गर्न, • आत्मपरक र वस्तुपरक निबन्ध सिर्जना गर्न, • घटना, समारोह र निरीक्षण भ्रमणमा आधारित प्रतिवेदन लेख्न ।	**एकाइ चार : लिखित अभिव्यक्ति** (८) ४.१ निर्देशित र स्वतन्त्र अनुच्छेद रचना ४.२ आत्मपरक र वस्तुपरक निबन्ध लेखन ४.३ घटना, समारोह र निरीक्षण भ्रमणमा आधारित प्रतिवेदन लेखन
• निर्धारित साहित्यिक कृतिको सरसर्ती अध्ययन गरी प्रतिक्रियात्मक टिप्पणी लेख्न ।	**एकाइ पाँच : साहित्यिक कृतिको पठन, आस्वादन र प्रतिकियात्मक लेखन** (११) ५.१ कथा ५.१.१ रमेश विकल : मेरी सानी भतिजी प्रतिमा ५.१.२ इस्माली : आज शनिवार ५.२ कविता /गीत/गजल ५.२.१ भूपि शेरचन : मैनवत्तीको शिखा ५.२.२ हरिभक्त कटुवाल : रहर ५.२.३ दुर्गालाल श्रेष्ठ : फूलको आँखामा ..... ५.३ निबन्ध : ५.३.१ लक्ष्मीप्रसाद देवकोटा : शिक्षा ५.३.२ शारदा शर्मा : सुखसत्ता

	५.३.३ युवराज नयाँघरे : भेटौंला कर्फ्युमा ५.४ उपन्यास ५.४.१ केशवराज पिँडाली : बाँच्ने एउटा जिन्दगी

४. प्रायोगिक क्रियाकलाप र शिक्षण प्रविधि

प्रायोगिक क्रियाकलाप र शिक्षण प्रविधिलाई दुई समूहमा विभाजन गरिएको छ : पहिलोमा साधारण शिक्षण प्रविधि र दोस्रोमा विशिष्ट शिक्षण प्रविधि ।

४.१ साधारण शिक्षण प्रविधि

प्रत्येक एकाइमा आवश्यकताअनुसार शिक्षकले सम्बन्धित विषयवस्तुको प्रस्तुति, व्याख्यान, छलफल, प्रश्नोत्तर गराई विद्यार्थीहरूलाई तत्सम्बन्धी अभ्यास गर्न लगाइने छ ।

४.२ विशिष्ट शिक्षण प्रविधि

एकाइ	क्रियाकलाप
एक	• व्यक्तिगत रूपमा काल, पक्ष, भाव, वाच्य, करणका आधारमा स्वतन्त्र रचना तयार गरी कक्षामा प्रस्तुत गर्न लगाउने, • जोडी समूहमा विभिन्न प्रकारका वाक्यहरू दिई संश्लेषण गर्न र संश्लेषित वाक्यहरूलाई विश्लेषण गर्न लगाउने, • समूहअनुसार पाठ्यसामग्रीमा आधारित भई व्याकरणिक संसक्ति र कोशीय संसक्तिको उदाहरण खोजी कक्षामा प्रस्तुत गर्न लगाउने ।
दुई	• जोडी समूहका रूपमा पाठ्य सामग्री हेरी विभिन्न प्रकारका सूचना र तथ्यलाई वृत्ताकार, स्तम्भ, आरेख र रेखाचित्रमा प्रस्तुत गर्न लगाउने,
तिन	• समूह अनुसार विभिन्न विषय क्षेत्रसँग सम्बन्धित सामग्रीमा आधारित भई बोध प्रश्नको उत्तर लेख्न लगाउने र कक्षामा प्रस्तुत गर्न लगाउने
चार	(क) निर्देशनअनुसार स्वतन्त्र र निर्दशित प्रकृतिका अनुच्छेद वैयक्तिक रूपमा लेखन गरी कक्षामा प्रस्तुत गर्न लगाउने (ख) दिइएको शीर्षकमा संरचनाअनुसार समूहगत प्रतिवेदन लेखन गराई कक्षामा प्रस्तुत गर्न लगाउने
पाँच	• निर्धारित साहित्यिक कृतिको पठन, आस्वादन र प्रतिक्रियात्मक लेखनका लागि व्यक्तिगत वा सामूहिक अभ्यास गर्न लगाउने ।

५. मूल्याङ्कन प्रक्रिया

मूल्याङ्कन दुई प्रकारले गरिने छ :

(१) **आन्तरिक मूल्याङ्कन** : यसका निम्ति चालिस प्रतिशत अङ्क निर्धारण गरिएको छ । आन्तरिक मूल्याङ्कन कक्षा शिक्षणसँगै गरिने छ । यसको वितरण निम्नानुसार रहेको छ :

आन्तरिक मूल्याङ्कन (४० प्रतिशत)

क्रियाकलाप	अङ्क
• उपस्थिति	५
• सिकाइ क्रियाकलापमा सहभागिता	५
• पहिलो आन्तरिक परीक्षा	१०
• दोस्रो आन्तरिक परीक्षा	१०

• तेस्रो आन्तरिक परीक्षा	१०
जम्मा	४०

(२) **बाह्य मूल्याङ्कनः** यसका निम्ति साठी प्रतिशत अङ्क निर्धारण गरिएको छ । बाह्य मूल्याङ्कन डिन कार्यालयले निर्धारण गरेको सेमेस्टर प्रणालीअनुसार हुने छ । यसका लागि निम्नानुसारको प्रश्नका लागि निम्नानुसारको अङ्क विभाजन गरिएको छ ।

बाह्य परीक्षा (६० प्रतिशत)

प्रश्नको किसिम		अङ्क
• बहु बैकल्पिक प्रश्न	(१०X१ = १०)	१०
• संक्षिप्त उत्तरात्मक प्रश्न (वैकल्पिक २)	(६X ५ = ३०)	३०
• विवेचनात्मक प्रश्न (वैकल्पिक १)	(२X१० = २०)	२०
जम्मा		६०

पाठ्यपुस्तक

गौतम, देवीप्रसाद, भण्डारी, पारसमणि र ओझा, रामनाथ (२०७०), *स्नातक नेपाली,* काठमाडौं : विद्यार्थी पुस्तक भण्डार (एकाइ १-४ का लागि) ।

शर्मा, शारदा (२०६३), *अग्निस्पर्श,* काठमाडौं : एकता प्रकाशन । (एकाइ ५ का लागि)

शेरचन, भूपि (२०६५), *घुम्ने मेचमाथि अन्धो मान्छे,* ललितपुर : साझा प्रकाशन । (एकाइ ५ का लागि)

श्रेष्ठ, दुर्गालाल (२०६७), *सन्तको छाता,* काठमाडौं : एकता प्रकाशन । (एकाइ ५ का लागि)

सन्दभ सामग्री

इस्माली (२०५८), *घाम घामजस्तो छैन, ललित*पुर : साझा प्रकाशन । (एकाइ ५ का लागि)

देवकोटा, लक्ष्मीप्रसाद (२०६८), *लक्ष्मी निबन्ध सङ्ग्रह,* ललितपुर : साझा प्रकाशन । (एकाइ ५ का लागि)

नयाँघरे, युवराज (२०६६), *एकहातको ताली,* काठमाडौं : विद्यार्थी पुस्तक भण्डार । (एकाइ ५ का लागि)

पिँडाली, केशवराज (२०६५), *बाँच्ने एउटा जिन्दगी,* ललितपुर : साझा प्रकाशन । (एकाइ ५ का लागि) विकल, रमेश (२०२५), *एउटा बूढो भ्वाइलेन आशावरीको धूनमा,* ललितपुर : साझा प्रकाशन । (एकाइ ५ का लागि)

Course Title: General English II

Course No. : Eng. Ed. 421
Level: B. Ed
Semester: Second

Nature of the course: Theoretical
Credit hours: 3
Teaching hours: 48

1. Course Description

This course is designed to develop their proficiency in listening, speaking, reading and writing. It also intends to equip them with knowledge of vocabulary needed for academic purpose. The course includes listening, speaking, reading and writing components. The listening, speaking and reading components deal with a wide variety of carefully selected materials. They include, among other things, informative passages on contemporary and critical issues. The writing part includes materials geared to developing various writing skills required for effective communication on matters of general and academic interests.

2. General Objectives

The general objectives of this course are as follows:

- To help students listen for comprehension.
- To help students make fluent speaker.
- To familiarize students with the techniques of enriching vocabulary.
- To develop in students an ability to comprehend and interpret different kinds of written texts by exposing them to a wide variety of authentic contemporary reading materials.
- To develop in students different kinds of writing skills needed for effective communication on matters of general and academic interests.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Use prior knowledge and personal experience to predict content • Listen for main ideas and details • Make inferences to fully understand what a speaker means • Listen for opinion to understand book review • Listen for reduced verb forms to understand everyday speech • Listen for causes and effects to understand relationships among idea	**Unit I. Listening (10)** 1.1. First impression 1.2. The psychology of first impression 1.3. Making inferences and listening for main ideas and details 1.4. Reviewing a book 1.5. Listening for causes and effects 1.6. Taking notes using a T- chart 1.7. Changing expectations 1.8. Corporate social and personal responsibility 1.9. Inferring a speakers attitude

• Follow a summary for several ideas • Listen for opinion	1.10. Identifying fact and opinion, amounts 1.11. Advertising ethics and standards 1.12. Financing a dream 1.13. Understanding figurative meaning
• Make notes to prepare for a presentation or group discussion • Take turns to make conversation go smoothly • Imply opinions to avoid stating them too directly • Give advice and reasons • Ask for clarification • Clarify what you say • Describe a situation using details • Ask, express and use reasons • Make notes • Prepare a dialogue	**Unit II: Speaking** **(8)** 2.1 Taking conversation turns 2.2 Asking for and giving clarification 2.3 Asking for and giving reasons 2.4 Leading a group discussion 2.5 Giving and supporting your opinions and ideas 2.6 Giving a short presentation 2.7 Recapping a presentation 2.8Agreeing and disagreeing 2.9 Expressing emotions
• Read texts for general idea. • Find specific information in the text. • Comprehend the text for detailed understanding. • Read and make notes of the important points. • Draw inferences and implications from varieties of reading texts. • Give opinions and express attitudes.	**Unit III: Reading** **(15)** 3.1 Determining co-references 3.2 Matching things 3.3 Understanding instructions 3.4 Unscrambling texts and anagrams 3.5 Scanning: locating and extracting information 3.6 Skimming: finding out main point and the central idea 3.7 Drawing inferences and implications 3.8 Assessing opinions and attitudes 3.9 Solving problems and puzzles
• Write an imaginary dialogue, short sketch of a person, story • Prepare a speech and Post card • Write a report • Rewrite given texts in different forms. • Compose short and long texts in the given topics. • Write texts maintaining coherence	**Unit IV: Writing** **(15)** 4.1 Rewriting: Rephrasing and paraphrasing 4.2 Parallel writing 4.3 Completing a text 4.4 Organizing a text: Sequencing instructions, ordering information, connecting ideas 4.5 Writing summaries 4.6 Writing letters: Personal, business, job application

and cohesion. • Interpret different types of texts. • Explain opinions and attitudes. • Write letters, resumes, summaries and short reports. • Write varieties of essays.	4.7 Writing curriculum vitae (resume) 4.8 Writing reports: Events and news 4.9 Writing essays: Descriptive, expository, narrative, argumentative

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.

4.3 General Instructional Techniques

Following general techniques are suggested for the overall delivery of the course.

- Lecture
- Discussion
- Explanation
- Illustration
- Demonstration
- Quizzes
- Guided study

It is expected that students are fully engaged in the lesson and sessions are interactive while presenting the lesson.

4.4 Specific Instructional Techniques

Some specific techniques are suggested to ensure the active engagement of the students.

Unit I	Small group discussion for the various grammar points, pair work to find out the rules of language, mini-projects to research the various grammar points in the texts.
Unit II	Individual practice and small group discussion and pair work.
Unit III	Individual study, pair works for reading tasks and presentation.
Unit IV	Individual assignment on various writing tasks, small group discussion and presentation.

In addition to the techniques mentioned above, observation of an English language class where children with different abilities are studying followed by presentation is also encouraged in all the units.

5. Evaluationand Time Allotment

The time and weighting allocated for the entire course is as follows:

Unit	weighting	Time
I Grammar	20%	20%
II Vocabulary	15%	15%
II Reading	30%	30%
III Writing	35%	35%

5.1 Internal Evaluation 40%

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

- Attendance 5 Points
- Participation in learning activities 5 points
- First assignment/midterm exam 10 points
- Second assignment/assessment (1 or two) 10 points
- Third assignment/assessment 10 points

Total **40 points**

5.2 External Evaluation (Final Examination) 60%

Examination Division, Office of the Dean, Faculty of Education will conduct final examination at the end of the semester. Type of questions and the points allocated for them are as follows:

- Objective type question (Multiple choice 10 × 1 point = 10 points
- Short answer questions (6 questions with 2 OR × 5 points) = 30 points
- Long answer questions (2 questions with 1 Or × 10) = 20 points

Total **60 points**

6. Recommended Books and Reference Materials

Recommended Books

Awasthi, J. R. , Bhattarai, G. R. & Rai, V. S. (eds.) (2008). *English for the New Millennium.* Kathmandu: EKTA Books. **(For units III to IV) (Selected Lessons)**

Craven, M. and Sherman, K.D. (2011). Q: Skills for Success: 3: Listening and Speaking. Oxford: Oxford University Press. **(For units I and II)**

Following lessons have been selected from the book **English for the New Millennium:**

Unit I : Legend, Lore and Education

a. Whole Child Education
b. The Five Dimensions of Education
c. The Essentials of Education

Unit II: Short Stories

a. The Gateman's Gift
b. The Martyr
c. The Joys of Motherhood
e. Grief

Unit III: Non Fictional/ Factual Writings

a. I Once Was Lost
b. Albert Einstein
C. Music and Science

Unit IV: Essays

a. Victory on Everest
b. Laughter is the Best Medicine
c. Liberty and Democracy

Unit V: Interviews

a. ImreKertesz

Unit VI: One Act Plays

a. A Horseman in the Sky

Unit VII: Memoir and Travel

a. The Boatman's Gift

Unit VII: Journals

a. Journal Writing II

Unit IX: Novel Extract and Motion Picture

a. My Love Story with the City of Joys

Unit X: Contemporary Topics

a. Inclusive Education
b. English as a World Language
c. Diasporas and Language
d. The New Electronic Media

Unit XI: Poems

a. Composed upon Westminster Bridge
b.Mid- Summer Noon in the Australian Forest
c. Baby's World
d. Butcher Shop
e. If
f. Before the Battle
g. Letter from Foreign Grave
h. Sonnet

Reference

Hornby. A.S. (2010). Oxford Advanced Learner's Dictionary (8th Edition). Oxford: Oxford University Press.

Course Title: Digital Logics **Program: BICTE**

Course No. : ICT Ed. 425
Level: Bachelor
Semester: Second

Nature of course: Theoretical + Practical
Credit Hour: 3 (2T+1P)
Teaching Hour: 64 (32+32)

---

1. Course Description

This course provides students with the basic concepts of digital logic, organization and architecture of digital computers as foundation for more advanced computer related studies. It also intends to provides the skill on able to design simple digital devices and implement them. It covers the knowledge area of digital system, logic gates and Boolean algebra, combinational and sequential circuit design, registers, counters, memories and programmable logic devices and VHDL. Laboratory work is essential in this course.

2. Course Objectives

Following are the general objective of this course:

- To make the student knowledgeable about fundamental digital logics and switching networks as well as to exposure of Boolean Algebra and its application for circuit analysis.
- To enable the student to identify the design concept of multilevel gates networks, flip-flops, counters and logic devices.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Differentiate between digital and analog system. • Calculate and convert the number system digital, binary, octal and hexadecimal. • Create complement numbers and use it to perform addition. • Define codes such as ASCII, Gray, BCD, XS-3	**Unit 1: Introduction to Digital System (5T+5P)** 1.1 Introduction to Analog and digital system 1.2 Number Systems- Decimal, Binary, Octal, Hexadecimal and conversion among them 1.3 Binary Addition and Subtraction 1.4 Complement of Binary Numbers: 1's and 2's 1.5 Adding signed 2's complement data 1.6 Digital Codes: BCD, XS-3, Gray code, alphanumeric codes (ASCII) ***Practical Work:*** • Practices on Number conversion between Decimal, Binary, Octal, Hexadecimal. • Binary Arithmetic 1's, 2's
• Explain Boolean Logic and Boolean Algebra • Generate the logic gates with diagram, truth table and Boolean expression.	**Unit 2: Logic Gates and Boolean Algebra (10T+8P)** 2.1 Logic Gates 2.1.1 Basic gates (AND, OR, NOT)

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

• Explain Boolean Algebra and laws of Boolean Algebra • Identify universal gate and draw circuit using only universal gates • Simplification of Boolean algebra with Boolean rules • Simplification of Boolean algebra with Karnaugh Map	2.1.2 Derived Gates (NAND, NOR, X-OR, X-NOR) 2.1.3 Universal Gates (NAND, NOR) 2.1.4 Designing circuits with basic gates, derived gates and universal gates 2.2 Introduction to Boolean Algebra 2.3 Boolean Expression and Boolean Rules 2.4 Types of Boolean Expression 2.4.1 Sum of Product Terms (SOP) 2.4.2 Product of Sum Terms (POS) 2.5 Standard form of SOP and POS Expression 2.6 Conversion between SOP and POS Expression 2.7 Canonical Form of Boolean Expression (min term, max term) 2.8 Representation of Boolean Expression in Truth Table 2.9 Applying Boolean Rules to Simplify Expressions 2.10 Introducing Karnaugh Map (K-Map) to minimize Boolean expression 2.11 Don't care condition in K-Map ***Lab Work:*** • Verification of AND, OR, NOT, NAND, NOR, XOR, and XNOR gate. • Apply Boolean rules to simplify Boolean expression. • Apply K-Map to simplify Boolean expression
• Explain combinational circuits • Implement the adder, multiplexers and de-multiplexers • Implement the encoders and decoders • Apply combinational circuit design procedure • Design 7 segment display decoder circuit	**Unit 3: Combinational Circuit (8T+4P)** **3.1** Introduction to Combinational Circuit and its design procedure **3.2** Arithmetic Circuit: Adder (Half and Full), Subtractor (Half and Full) **3.3** Code Converter (Gray to Binary and Binary to Gray) **3.4** Multiplexers and Demultiplexers **3.5** Encoders and Decoders **3.6** 7 Segment Display Decoder ***Lab Work:*** • Design the adder and subtractor • Design Mux/Demux and Encoder/Decoder(upto 4 bit) • Design the digital code converter circuit

	• Design Display Decoder circuit
• Explain Sequential Logic Circuits • Design Flip-flop circuits • Create flip-flop excitation table, characteristics table and timing diagrams	**Unit 4: Sequential Circuit Fundamentals** **(3T+3P)** 4.1 Introduction to sequential circuit 4.2 Latch and flip flop Introduction 4.3 Types of flip flop : SR, JK, D, and T 4.4 Characteristics table, characteristics equation, excitation table, circuit diagram and operating characteristics of flip flops 4.5 Drawing Timing Diagram for Sequential Circuit ***Lab Work:*** • Design the different types of flip-flops. • Draw timing diagrams
• Explain counters • Implement different synchronous and asynchronous counter.	**Unit 5: Counter** **(5T+3P)** 5.1 Introduction to Counter 5.2 Synchronous and Asynchronous Counter 5.3 Modulus 2^n and Modulus other than 2^n Asynchronous Counters 5.4 Cascaded Counter ***Lab Work:*** • Design the different synchronous and asynchronous counters. • Design higher modulus asynchronous counter using cascaded counter • Realize truncated counters
• Explain Shift Registers. • Implement different types of shift registers	**Unit 6: Shift Register** **(5T+3P)** 6.1 Introduction to Shift Register 6.2 Serial In Serial Out Register (SISO) 6.3 Serial In Parallel Out Register (SIPO) 6.4 Parallel In Parallel Out Register (PIPO) 6.5 Parallel In Serial Out Register (PISO) 6.6 Bidirectional Register 6.7 Shift Register Counters (Ring and Johnson) ***Lab Work:*** • Design different types shift registers

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

	• Design higher modulus asynchronous counter using cascaded counter Realize truncated counters
• Analyze and design synchronous sequential circuits • Analyze asynchronous sequential circuits	**Unit 7: Sequential Circuit Design (3T+3P)** 7.1 Sequential Circuit Design Procedure 7.2 Synchronous Counter Design 7.3 Analysis of Synchronous Sequential Circuit ***Lab Work:*** • Design different types shift registers • Design higher modulus asynchronous counter using cascaded counter
• Define IC and level of integration • Describe digital logic families • Implement PLA and PAL	**Unit 8: IC and Programmable Logic Devices (4T)** 8.1 Integrated Circuit and level of integration 8.2 Operating characteristics of IC 8.3 IC Packages 8.4 PLDs: PAL and PLA 8.5 Logic Families: TTL, ECL, and CMOS
• Define concept of VHDL • Design simple circuits by using VHDL	**Unit 9: VHDL (5T+3P)** 7.1 Introduction to VHDL 7.2 Representation of Boolean expression in VHDL **LAB Work:** • Demonstrate the different circuit in VHDL

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 particular units.

4.1 General Instructional Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of multi-media projector, 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. Unit one and three are theoretical and numerical chapters so, they require more exercise and demonstration of principles. Use more pictures, flowchart of method, and assignment. Specifically, demonstration with practical works will be specific instructional technique in this course. The details of suggested instructional techniques are presented below:

Units	Activities
Unit 2: Logic Gates and Boolean Algebra	• Verify AND, OR, NOT, NAND, NOR, XOR, and XNOR gate using physical real bread board and two input TTL ICs. • Demonstration by the teacher on physical real device and circuitry design to demonstrate the working principle, objective and their use. • Individual lab work of real bread board by each student • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 3: Combinational Circuit	• Design the adder and subtracter, Implement logic of Mux/Demux and Encoder/Decoder, and Design the number system converter circuit, Design Various Decision making circuits. • Lab work in pairs in different tasks assigned by the teacher • Monitoring of students' work by reaching each pair and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 4: Sequential Circuit Fundamentals	• Design SR, JK, D and T flip-flops with their excitation table and design procedure. • Demonstrate the objective, use and practically implement the master slave flip-flop. • Demonstrate the state diagram of any simple sequential circuit. • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 5, 6, 7, 8: Registers, Counters, and Programmable Logic Devices	• Demonstrate the implement the concept, objective and real use of registers, counters, memories and PLDs. • Design any clock driven sequential circuit, verify the principle of conversion of parallel data into serial. Design circuits like: digital clock, voting system, counting machine, storage device, traffic control system, frequency division circuits, and analyze circuits. • Demonstrate the interfacing method with various types of logic families and integrated circuits. • Monitoring of students' work by reaching each student and

	providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 7: VHDL	• Explain the fundamental of VHDL programming language using class lecture method. • VHDL language should be taught to specify the logic circuits. Instructor should illustrate how VHDL can be used to specify the desired functionality and how CAD tools provide a mechanism for developing the required circuits. Instructor should assign design projects like Adder/Subtracter, Multiplexer/Demultiplexer, Encoder/Decoder, Flip-flops, resister and counters to each individual using both methodologies: manual design and CAD tools to design logic circuits.

5. Evaluation

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

Internal Assessment Theory	Internal Assessment Practical	Semester Examination (Theoretical exam)	External Practical Exam/Viva	Total Points
25 Points	15 Points	40 Points	20 Points	100 Points

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

5.1 Internal Assessment (25 Points) of Theoretical Part

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

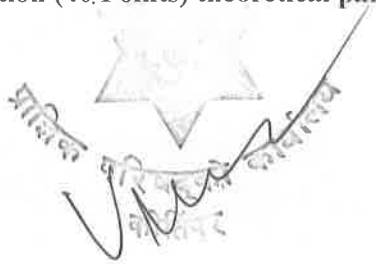
Attendance and learning Activities	5 points
First assignment (Written assignment)	5 points
Second assignment (Project work with presentation)	10 points
Third assignment/written examination	5 point
Total	25 points

5.2 Internal Assessment (15 Points) of practical part

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

Attendance and learning Activities	5 points
Practical work/project work/lab work	10 points
Total	15 points

5.3 Semester Final Examination (40 Points) theoretical part



Examination Division, Dean office will conduct final examination at the end of semester.	
Objective question (Multiple choice questions 10 x 1 point)	10 Points
Subjective questions (6 questions x 5 marks with 'OR" two questions)	30 Points
Total	40 points

5.4 **Practical Exam/Viva (20 Points)**

Examination Division, Office of the Dean will appoint an external examiner (ICT teachers working another campus) for conducting practical examination

Items	Points
Evaluation of Record Book	4
Project work/practical work presentation/skill test	10
Viva	6
Total	20

6. **Recommended Books and References materials**

Recommended Books:

Floyd, T. L. (2009). *Digital fundamentals* (10th ed). Upper Saddle River, N.J: Pearson/Prentice Hall.

Mano, M. M., & Kime, C. R. (2008). *Logic and computer design fundamentals* (4. ed). Upper Saddle River, NJ: Pearson Prentice Hall.

References materials:

Brown, S. D., & Vranesic, Z. G. (2014). *Fundamentals of digital logic with Verilog design* (Third edition). New York: McGraw-Hill Higher Education.

Rafiquzzaman, M. (2005). *Fundamentals of digital logic and microcomputer design* (5th ed). Hoboken, N.J: J. Wiley & Sons.

Mano, M. M. (2002). *Digital design* (3rd ed). Upper Saddle River, NJ: Prentice-Hall.

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

Course Title: Object Oriented Programming with C++ Program: **BICTE**

Course No. : ICT. Ed. 426 | Nature of course: Theoretical + Practical

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

Semester: Second | Teaching Hour: 80hours (32+48)

---

1. **Course Description**

The aim of the course is to develop the skill on thinking about computation and problem solving in Object Oriented Paradigms. The course helps the students to discover the basic concepts of object-oriented programming concept such as object, class, inheritance, polymorphism, abstraction and encapsulation and apply in C++. Students are more engaged in laboratory work to exaction of programing experiments rather than theoretical concept.

2. **General Objectives**

Following are the general objective of this course:

- To acquaint the student with fundamentals object oriented paradigms and programming style in C++ programming language.
- To develop the skill on apply object oriented programming concept in programming.
- To enable a student in explore the new software development paradigms.

3. **Course Outlines:**

Specific Objectives	Contents
• Compare procedure and object oriented programming concept • Describe the feature of object oriented programming. • Compare C and C++. • Demonstrate the C++ programming styles.	**Unit 1: Concept of C++ with Object Oriented Programming (6T+4P)** 1.1 Structured vs Object Oriented Programming Paradigm 1.2 Features of Object Oriented Programming 1.3 Comparison on C and C++ 1.4 C++ Program Structure 1.5 Data types, variables and constants 1.6 Insertion and Extraction Operators 1.7 Type conversion 1.8 Dynamic memory allocation : new and delete operator **Practical Works:** • Install the compiler of C++. • Use Insertion and Extraction Operator. • Use structure in C++ to bundle data
• Demonstrate inline function, function overloading, default arguments, reference arguments and returning by reference concept	**Unit 2: Function in C++** **(3Th+3Pr)** 2.1 Inline function 2.2 Overloaded function 2.3 Default arguments 2.4 Reference arguments 2.5 Returning by reference **Practical Works:** • Write program to implement inline function, overloaded function, default arguments, reference arguments and returning by reference

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

• Explain the Object and Class • Define Data member and Member function. • Define inline member function. • Use array in member function and objects. • Define static and friend function. • Explain constructor and destructors.	**Unit 3: Object and Class** **(5T+10P)** 3.1 Concept of Object and Class 3.2 Access controls: private, protected and public 3.3 Data Member and Member Function of class 3.4 Constructor and Destructor 3.5 Default, Parameterized and Copy constructor 3.6 Constructor Overloading 3.7 Array in Class and Array of Objects 3.8 Static data member and Static member function 3.9 Friend function and friend class **Practical Works:** • Create class and objects with data member and member function. • Declare and define member function and data member with visibility. • Create static function • Create friend functions. • Create different types of constructors
• Explore the concept of inheritance • Describe the derived class and access specifier • Apply single, multiple, multilevel inheritance. • Identify function overriding and ambiguity in inheritance with possible solution • Demonstrate execution sequence of constructor and destructor in inheritance • Implement containership	**Unit 4: Inheritance** **(3T+9P)** 4.1 Concept of Inheritance 4.2 Deriving class using access specifiers: private, public and protected 4.3 Types of Inheritance 4.4 Function overriding 4.5 Ambiguity due to multiple inheritance 4.6 Execution sequence of constructor and destructor in inheritance 4.7 Containership **Practical Works:** • Create different types of inheritance. • Write program to illustrate execution sequence of constructor and destructor in inheritance • Create containership • Identify and solve the ambiguity due to multiple inheritance
• Describe Virtual	**Unit 5: Polymorphism, Abstraction and Encapsulation** **(3T+3P)**

function. • Describe the Pure virtual function. • Describe the Abstract class • Demonstrate early binding (Compile time polymorphism) and late binding (runtime polymorphism)	5.1 Introduction to Virtual Function 5.2 Pure Virtual function 5.3 Abstract Class 5.4 Runtime Polymorphism and Compile time Polymorphism 5.5 Implementation of encapsulation **Practical Works:** • Create virtual function. • Create pure virtual function. • Create Abstract class • Write program to compare different types of polymorphism
• Apply Binary operator and unary operator overloading. • Describe data conversion methods.	**Unit 6: Operator Overloading** **(4T+6P)** 6.1 Introduction to Operator Overloading 6.2 Unary Operator Overloading: prefix/ postfix ++, -- 6.3 Relational Operator Overloading: >, >=. <, <=, ==, != 6.4 Arithmetic Operator Overloading: +, -, *, /, % 6.5 Type Conversion i. Basic to user-defined types ii. User-defined to basic types iii. User-defined to user-defined types **Practical Works:** • Overload unary operator, relational operator and arithmetic operators • Apply data conversion techniques to convert different types of data
• Explain concept of template. • Demonstrate namespace creation and use of it in programs • Define function template and class template. • Apply the different exception handling methods.	**Unit 7: Namespace, Template and Exception Handling** **(4T+6P)** 7.1 Namespace Concept, creation and usage in programs 7.2 Concept of Template 7.3 Function Template 7.4 Class Template 7.5 Basic of exception handling 7.6 Exception handling mechanism: throw, catch and try 7.7 Exception handling of basic types and user-defined types **Practical Works:** • Create and apply namespace • Create and apply function template. • Create and apply template class.

	• Apply try, catch and throw methods in program to handle exception for user-defined and basic types.
• Explain concept of files • Demonstrate stream classes • Demonstrate sequential and random access to file	**Unit 8: File Handling** **(3T+3P)** 8.1 Introduction to file stream 8.2 fstream, ofstream and ifstream classes 8.3 Using constructor to open file 8.4 File opening modes in C++ 8.5 Using open function to open file 8.6 Sequential and Random access to file **Practical Works:** • Apply fstream, ifstream and ofstream classes to manipulate files • Access files sequentially and randomly
• Create console application using C++ .	**Unit 9: Project** **(5P)** Develop simple Application using C++.

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 particular units.

4.1 General Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of multi-media projector, 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. The details of suggested instructional techniques are presented below:

Units	Activities
Unit 1: Concept of Object Oriented Programming	• Select and Install the different compiler of C++ such as Code Block, Dev C++ etc. • Demonstrate the programming structure of C++. • Compare the other program provide the assignment for understanding of object oriented paradigms. • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 2, 3:Function,	• Demonstrate inline function, function overloading, default arguments, reference arguments and returning by reference.

Object and Class	• Demonstrate class and object creation methods in C++. • Demonstrate the methods and attributes in Class and access from objects. • Demonstrate the different types of methods such as inline, static and friends. • Lab work in pairs in different tasks assigned by the teacher • Monitoring of students' work by reaching each pair and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 4: Inheritance	• Demonstrate the single, multiple and multilevel inheritance and applied into C++. • Lab work in pairs in different tasks assigned by the teacher. • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 5: Virtual Function and Polymorphism	• Demonstrate the virtual and pure virtual functions and application. • Demonstrate the abstract and container class. • Lab work in pairs in different tasks assigned by the teacher. • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 6: Operator Overloading	• Demonstrate the unary and binary operator overloading methods. • Lab work in pairs in different tasks assigned by the teacher • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 7: Namespace, Template and Exception Handling	• Demonstrate Namespace creation and usage • Demonstrate the template function and class. • Demonstrate the exception handling concept in OOPs with reference C++. • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 8: File Handling	• Demonstrate stream classes • Demonstrate file opening and closing • Demonstrate random access and sequential access to file
Unit 9: Project	• Develop console application applied with OOPs Concepts including file handling.

5. Evaluation :

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

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

Internal Assessment Theory	Internal Assessment Practical	Semester Examination (Theoretical exam)	External Practical Exam/Viva	Total Points
25 Points	15 Points	40 Points	20 Points	100 Points

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

5.1 Internal Assessment (25 Points) of theoretical part

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

Attendance and learning Activities	5 points
First assignment (Written assignment)	5 points
Second assignment (Project work with presentation)	10 points
Third assignment/written examination	5 point
Total	25 points

5.2 Internal Assessment (15 Points) of practical part

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

Attendance and learning Activities	5 points
Practical work/project work/lab work	10 points
Total	15 points

5.3 Semester Examination (60 Points)

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

Objective question (Multiple choice questions 10 x 1 point)	10 Points
Subjective Questions (6 questions x 5 marks With "OR" two questions)	30 Points
Total	40 points

5.4 **Practical Exam/Viva (20 Points)**

Examination Division, Office of the Dean will appoint an external examiner (ICT teachers working another campus) for conducting practical examination

Items	Points
Evaluation of Record Book	4
Project work/practical work presentation/skill test	10
Viva	6

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

Total	20

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

Recommended books:

Balagurusamy, E. (2013). *Object oriented programming with C++*. New Delhi: Tata McGraw-Hill (Unit 1-8).

BaralDayasar&BaralDiwakar(2010), Secrete of Object Orientd Programming in C++, Kathmandu, BhundipuranPrakashan (Unit 1-8).

References materials:

Robert Lafore(2003), Object Oriented Programming in Turbo C++, Galgotia Publications Ltd. India, 2003 (Unit 1-8).

Schildt, H. (2003). *C++: the complete reference* (4th ed). New York: McGraw-Hill.

Lippman, S.B., Lajoie. J., C++ Primer, 3rd Ed., Addison Wesley, 1998

Course Title: Mathematics II | **Nature of Course: Theory**

Level: BICTE | **Teaching Hours: 48**

Code Number: Math Ed. 426 | **Full Marks: 100**

Semester: Second | **Credit Hours: 3**

1. Course Introduction

The course Math II is an integrated course of different branches of mathematics for the students at bachelor's degree students of Information and Communication Technology (BICTE). This course deals the different concepts of mathematics which are applicable in the study of information and communication technology. The course comprised six units from different areas of mathematics. Complex numbers, calculus, basics of number theory, analytic geometry, fundamental concepts of graph theory and algebra are six chapters. These chapters are primarily designed to provide the foundational concepts of mathematics which are crucial in the field of study.

2. General Objectives

The general objectives of this course are as follows:

- To visualize the concept of complex numbers and their properties.
- To familiarize the concept of limit, continuity, derivative and integration.
- To introduce the concept of numbers and number theory.
- To explain the concept of coordinates in plane and space.
- To visualize the concept and graph theory and connect this concept with technology.
- To familiarize the basic concept of group and ring theories.

3. Specific Objectives and Contents

Specific objectives to each unit and corresponding contents are described below:

• Define complex number and visualize the complex number in Argand diagram. • Find the conjugate and absolute value of complex number • Find the square roots of complex number • Explain the relation of sets and subsets • Convert the complex number from cartesian form to polar and exponential form and vice-versa. • Find the nth roots of given complex numbers using DeMoivre's Theorem.	**Unit I Complex Number [6]** 1.1 Definition of complex number and Geometrical representation. 1.2 Conjugate and absolute value of complex number 1.3 Square roots of complex number 1.4 Polar and Exponential forms of complex numbers 1.5 n^{th} roots of complex numbers using DeMoivre's Theorem
• Define limit of the function using the $\varepsilon - \delta$. • Discuss the existence of limit of function. • Test the continuity of the function. • Discuss the types of discontinuity of the function • Define derivative with example • Derive the formula to find the derivatives of the function using definition • Find the derivatives of functions • Define extreme values of a function • Find the maxima and minima of function • Differentiate the definite and indefinite integrals • Evaluate standard indefinite integrals • Define the fundamental theorem of calculus. • Evaluate the area of plane regions using definite integrals.	**Unit II: Fundamentals of Calculus [12]** **2.1 Limits and continuity of a function** 2.1.1 $\varepsilon - \delta$ definition of limit and continuity. 2.1.2 Evaluate the limit of the function 2.1.3 Continuity of the function **2.2 Derivatives of function** 2.2.1 Definition and Geometrical interpretation 2.2.2 Derivatives of the functions (Algebraic only) 2.2.3 Maxima and minima of functions **2.3 Indefinite and Definite Integral** 2.3.1 Meanings of Integrals 2.3.2 Some Standard Integrals 2.3.3 Meaning of $\int_a^b f(x)dx$ 2.3.4 Problems on finding definite integral 2.3.5 Area of plane regions

3. Discuss the odd, even and divisibility relationship of number 4. Derive the divisibility rule for positive integers 5. Define division algorithm 6. Solve the problems related to division algorithm 7. Discuss the properties of GCD and solve the problems related to GCD 8. Discuss the different forms of Euclidean Algorithm 9. Execute the operations on different base number system. 10. Discuss the concept of modular arithmetic.	**Unit III Basics of Number Theory [6]** 3.1 Odd, Even and Divisibility Relationships 3.2 The Divisibility Rules 3.3 The Division Algorithm 3.4 The Greatest Common Divisor (GCD) and Euclidean Algorithm 3.5 Different Base Number System 3.6 Modular Arithmetic
• Derive the equation of straight line in different form • Find the length of perpendicular distance from any point to a straight line • Derive the angle between two lines • Define a concept of coordinate of a point in a space • Solve the problems involving dcs., drs., and projection • Derive the equation of planes • Find the angle between two points • Derive the equation of plane passing through any three points	**Unit IV Analytic Geometry [8]** **4.1 Straight Lines** 4.1.1 Equation of straight lines 4.1.2 Perpendicular distance of a line 4.1.3 Angle between lines **4.2 Conic Section [Definitions and equations on Standard forms with examples]** 4.2.1 Circle 4.2.2 Parabola 4.2.3 Ellipse 4.2.4 Hyperbola **4.3 Coordinate in space** 4.3.1 Coordinates of a point in space 4.3.2 Distance between two points 4.3.3 Directions Cosines and Ratios 4.3.4 Projection

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

• Discuss the concept of graph and different types of graphs • Define walks, paths and cycles of graphs with example • Find the vertex and edge of graphs • Define and solve the problems related to Eulerian and Hamiltonian graphs • Discuss the concepts of trees and forest with illustrative example.	**Unit V: Fundamental Concepts of Graph Theory [6]** 5.1 Introduction of graph 5.2 Different types of Graphs 5.3 Vertex and edges of graphs 5.4 Walks, paths and cycles of Graphs 5.5 Eulerian and Hamiltonian graphs concept and examples only 5.6 Trees and Forest concept with examples.
• Define binary operation with examples • Discuss the properties of algebraic structure with examples • Define group with example and non-example • Discuss the properties of group • Define sub-group, cyclic group and permutation group with examples. • Define ring with examples. • Explain the concept of subring, ideal and quotient rings with examples • Derive the relation between integral domain and field	**Unit VI: Algebra [10]** **6.1 Group Theory** 6.1.1 Binary operation 6.1.2 Algebraic Structure and its properties 6.1.3 Group and its properties 6.1.4 Sub-groups, Cyclic groups and Permutation groups **6.2 Ring and Field** 6.2.1 Definition of rings and its properties 6.2.2 Subring definition with examples. 6.2.3 Field definition and examples.

4. Instructional Techniques

4.1 General Instructional Techniques: There are various techniques of teaching and learning so as to grasp the knowledge of mathematics. Although the methods of teaching and learning may differ, the techniques to be used are lecture, discussion, problem solving, inquiry, question answer, demonstration, collaborative teaching approach and problem-solving method.

4.2 Specific Instructional Techniques

The specific teaching and learning techniques (unit - wise) are listed below:

Units	Activities and Instructional Techniques	Teaching Hours (48)
I	Discussion and presentation	6
II	Problems solving and Project work in group and group presentation.	5
III	Problem solving and discussion	7
IV	Question answer and discussion in group	6
V	Assignment and Group discussion	10
VI	Project work in group and individual and problem solving	9
VII	Discussion and Questions answer	5

5. Evaluation

5.1 Internal Evaluation: (40%)

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

- Attendance 5 marks
- Participation in learning activities 5 marks
- First assignment 10 marks
- Second assignment 10 marks
- Third assignment 10 marks

Total 40 marks

5.2 External Evaluation (60%)

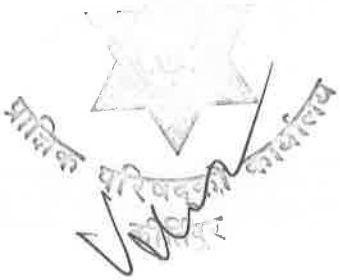
The examination section of Dean Office , Faculty of Education will conduct final examination at the end of the first semester .The type of questions and marks allocated for each question will be as follows :

- Objective questions (multiple choice) 10 x 1 mark = 10 marks
- Short answer questions (with two or) 6 x 5 marks = 30 marks
- Long answer questions (with 1 or) 2 x 10 marks = 20 marks

Total = 60 marks

6. Reference Books

Burton, D.M. (2011). *Elementary number theory*. The McGraw-Hill Companies, Inc. (Chapter III)



Bhattarai, B.N. (2017). *A Text book on Modern Algebra*. Kathmandu: Cambridge Publication Pvt. Ltd.

Goyal, J. K & Gupta, K. P. (2006). *Advance course in modern algebra (11th ed.)*. Meerut: Pragati Prakashan Educational Publisher.

Mittal P. K. (2007). *Analytical geometry,* Delhi: Vrinda Publication (P)LTD.

Maskey, S. M. (2002). *First Course in Graph Theory*. Kathmandu: Ratna Pustak Bhandar.

Bell, H.F. (1978). *Teaching and learning mathematics*. WMC Brown Company.

Das, B. C. & Mukharjee, B. (1984). *Differential Calculus*. Calcutta: U N Dhur and Sons Pvt Ltd.

Sharma, J. N. (1991). *Functions of a complex variable*. Krishna Prakashan Media.

BACHELOR OF INFORMATION AND COMMUNICATION TECHNOLOGY EDUCATION (BICTE)

Curriculum

Third Semester

List of Course

Course title: Learning Psychology
Course No.: Ed-432
Level: Bachelor.
Semester: Third

Program: BICTE
Nature of Course: Theoretical
Credit Hours: 3
Teaching Hours: 48

---

1. Course description

This course is designed to provide students with knowledge and understanding about learning theories and their application in teaching and learning. The course introduces different learning theories – behaviorism, cognitivism and constructivism. In addition, the course helps students to draw educational implications of different learning theories.

2. General objectives

The general objectives of this course are as follows:

- To help students develop understanding of the meaning and characteristics of learning from the lenses of empiricism and rationalism.
- To acquaint students with behaviorism and help them draw its educational implications.
- To develop students' understanding about cognitivism and help them draw its educational implications.
- To acquaint students with constructivism and enable them to draw its educational implications.
- To enable the students to critically discuss different learning theories, as well as to enable them to use these theories in classroom teaching.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Define the meaning of learning and discuss their characteristics. • Discuss the philosophical orientation of learning theories. • Define empiricism and discuss its link with behaviorism. • Discuss the characteristics of empiricism and behaviorism. • Discuss rationalism and link it with cognitivism.	**Unit 1: Learning Psychology (5)** 1.1. Meaning, definition and characteristics of learning 1.2. Philosophical foundations of Learning Theories 1.2.1. Empiricism and behaviorism 1.2.2. Rationalism and cognitivism
• Discuss the concept of behaviorsitic theories of learning. • Explain the Pavlovian conditioning and discuss its experiment on dog. • Describe the characteristics of Pavlovian	**Unit 2: Behavioristic Theories (20)** **2.1 Introduction to Classical Conditioning (Pavlovian conditioning).**

conditioning. • Draw the educational implications of Pavlovian conditioning. • Explain the Skinnerian conditioning and discuss its experiment on rat. • Define shaping and discuss the principle of shaping. • Mention the educational implications of operant conditioning. • Explain the Thorndike's theory of learning and discuss his experiment on cat. • Discuss the primary laws of learning. • Draw the educational implications of Thorndike's connectionism.	2.1.1 Basic process of conditioning and experiment on dog. 2.1.2 Phenomena and characteristics of classical conditioning: extinction, spontaneous recovery, inhibition, and generalization. 2.1.3 Educational implications of classical conditioning. **2.2 Operant Conditioning (Skinnerian Conditioning).** 2.2.1 Basic process of operant. conditioning and experiment on rat. 2.2.2 Positive and negative reinforcement. 2.2.3 Principle of shaping. 2.2.4 Educational implications of operant conditioning. **2.3 Connectionism (Thorndike's Theory of Learning).** 2.3.1 Basic process of conditioning (process of trial and error) and experiment on cat. 2.3.2 Primary laws of learning: law of readiness, law of exercise and law of effect. 2.3.3 Educational implications. 2.4 Applications of integrated approaches to learning 2.5 Addressing learning difficulties through different learning approaches.
• Define the concept of cognitive learning. • Explain insightful learning. • Discuss the characteristics of insightful learning. • Discuss the educational implications of insightful learning. • Explain the information processing theory. • Draw the educational implications of informational processing theory.	**Unit 3: Cognitive Theories (15)** 3.1 **Kohler's Insightful Learning** 3.1.1 Meaning and characteristics 3.1.2 Experiment on chimpanzee 3.1.3 Educational implications of Kohler's learning theory 3.2 **Information Processing Theory.** 3.2.1 Basic elements: Sensory register, short-term memory/store, long-term memory/store 3.2.2 Educational implications of information processing theory.

• Conceptualize the meaning constructivism. • Explain the basic principles of individual constructivism. • Discuss the knowledge construction process of individual constructivism. • Explain the basic principles of social constructivism. • Discuss the knowledge construction process of social constructivism. • Draw the educational implications of social constructivism. • Compare and contrast between individual constructivism and social constructivism.	**Unit 4: Constructivism (8)** 4.1 Individual constructivism (Piagetian constructivism) 4.1.1 Basic principle and knowledge construction: scheme, adaptation-assimilation and accommodation, equilibrium. 4.1.2 Classroom implications. 4.2 Social constructivism (Vygotskian constructivism. 5.2.1 Basic principle and knowledge construction: inter-psychological process and intra-psychological process; MKO, ZPD and scaffolding. 5.2.2 Classroom implications.

Note: The figures in the parentheses indicate approximate teaching hours for respective units.

5 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 specific units.

5.1 General Instructional Techniques

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

5.2 Specific Instructional Techniques

Unit	Suggested specific Instructional Techniques
I	• Students are divided into gender disaggregated groups. Each group is assigned to prepare key aspects of empiricism and rationalism and their linkage with behaviorism and cognitivism. The students will present the group work in the class.
II, III, IV	• Students are divided into groups. The groups will visit a nearby school, observe a class and assess which learning theories teachers are using. Each group prepares a report and present in the class.
V	• Students work in pair and discuss what educational implications can be drawn from constructivism for classroom teaching in their subject areas.

6 Evaluation

5.1 Internal Evaluation 40%

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

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

1) Attendance	5
2) Class participation	5
3) First assignment (Group work based on unit I, II, III & IV)	10
4) Second assignment (Pair work based on Unit V)	10
5) 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.

Objective type question (Multiple choice 10 x 1ponts)	10
Short answer questions (6 questions with 2 OR x 5 points)	30
Long answer questions (2 questions with 1 OR x 10 points)	20
Total	60

Recommended Books

Hergenhahn, B.R. & Olson, M. H. (1997). *An introduction to theories of learning.* NJ: Prentice Hall. **.(Unit: I, II, III, IV& V)**

Hilgard, B.R. & Bower, G. H. (1975). *Theories of learning.* New Delhi: Prentice Hall.**(Unit: I, II, III & IV)**

Klein, S.B. (1996). *Learning: Principle and application.* NY: McGraw Hill, Inc. **(Unit: I, II, III & IV)**

Reference Books

Chauhan, S. S. (2002). *Advanced educational psychology.* Vikas Publishing House Pvt. Ltd.

Dandekar, W.N. (2002). *Psychological foundation of education.* Macmillan India Limited.

Hill, W.F. (1975). *Learning: A Survey of psychological interpretation.* Great Britain: Lowe & Brydone.

Morgan C. T., King R..R., Weisz, J. R. & Schopler, J. (2004). Introduction to psychology. New Delhi: Tata McGraw Hill.

Woolfolk, A. (2004). *Educational psychology.* India: Pearson Publication.

Course Title: Web Technology | **Program: BICTE**
Course No.: ICT. Ed. 437 | Nature of course: Theoretical + Practical
Level: Bachelor | Credit Hour: 3 hours (2T+1P)
Semester: Third | Teaching Hour: 80hours (32+48)

---

1. **Course Description**

The aim of the course is to help students gain knowledge in the basic concepts of web development and build skills to develop web based application using the web tools, scripting and server side language. The goal of course is to provide application developers easy and complete understanding design of web page and integrated with MySQL and PHP which are most popular open source technologies.

2. **General Objectives**

After the completion of this course, the students should be able to:-

- To gain an understanding of the theories and concepts underlying web development
- To gain the skill of HTML structures and functionality.
- To develop the web based application with client side control mechanism
- To build skill to mapping of web design structure to coding using CSS
- To develop web application with server site scripting language.

3. **Course Outlines:**

Specific Objectives	Contents	
• Identify and explain different categories of HTML elements • Working with HTML tag for Text, List, Link, Table, Form and multimedia contents	**Unit 1: Introduction to HTML** 1.1 Getting Started with a Simple Web Page 1.2 Block and Inline Elements 1.3 Presentation and Phrase Elements 1.4 Empty and Non-empty Elements 1.5 HTML character entities 1.6 HTML List, Table, Links (Internal and External) 1.7 Multimedia Contents (Image, Audio, Video and YouTube Player) 1.8 Form Elements (text, password, file, radio, checkbox, textarea, hidden, select option, button, date, email)	12
• Identify and explain different CSS writing styles • Make use of CSS selectors to narrow down the element selection • Apply the CSS properties to design different HTML elements • Apply CSS properties to create simple page	**Unit 2: Cascading Style Sheet** 2.1 How CSS fit with HTML page? 2.2 Inline, Internal and External CSS 2.3 CSS Selectors 2.4 CSS Properties for text, list, table, background, link formatting 2.5 Pseudo classes: before, after, first-line, first-letter, hover, focus, active 2.6 Custom list numbering using content property 2.7 CSS Box Model: margin, padding and border 2.8 Creating Layouts with display, position and float property 2.9 Fixed and Liquid design of the page	12

layout		
• Integrate JavaScript within HTML documents • Build interactive site components • Make use of different JavaScript objects • Demonstrate form validation concept	**Unit 3: Client Side Programming with JavaScript** 3.1 How JavaScript fits into a web page? 3.2 JavaScript Basics: Variable, operators, 3.3 Understanding the Document Object Model (DOM) 3.4 Accessing HTML Elements with getElementById(), getElementsByClassName(), getElementsByName(), getElementsByTagName() 3.5 JavaScript objects: window, document, array, string, math, date 3.6 Writing scripts to handle events 3.7 Using JavaScript to validate user inputs	15
• Explain the basic concept of server side scripting • Apply php variables, control statements • Make use of functions and files • Demonstrate to handle array, string, date data	**Unit 4: Server Side Programming with PHP** 4.1 How PHP fits into a web page? 4.2 Variables and constants 4.3 Operators 4.4 Working with text and numbers 4.5 Making decisions with control statements (if, switch, loop) 4.6 Working with arrays, strings, datetime and files 4.7 Functions	10
• Design single and multipage web form to collect, store and disseminate data across web site • Apply the storing function to save collected data in CSV file	**Unit 5: Working with Web Form** 5.1 Creating simple web form 5.2 Creating multipage web form 5.3 Retrieving form data using post and get method 5.4 Storing form data to CSV file 5.5 Reading CSV file and displaying content as html table	12
• Identify and explain the use of database • Demonstrate the basic database operations: CRUD • Make use of session and cookie variables to remember web users • Develop Bulk import facility in database for users to save time in data entry • Reflecting database record into the CSV file for distribution	**Unit 6: Database and PHP** 6.1 Introduction to database 6.2 Create, Retrieve, Update and Delete operation in database 6.3 Connecting to database through PHP mysqli_connect() 6.4 Executing Queries with mysqli_query() 6.5 Fetching data with mysqli_fetch_assoc() and mysqli_fetch_array() 6.6 Creating user registration and login feature 6.7 Remembering users with cookies and session 6.8 Converting database table to CSV file using fputcsv() 6.9 Reading CSV file and reflecting the contents in database	15

purpose		
• Assign dynamic web site project	**Unit 7: Project Work Assignment**	4

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 particular units.

4.1 General Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of multi-media projector, 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. The details of suggested instructional techniques are presented below:

Units	Practical Activities
Unit 1: Introduction to HTML	• Selection of HTML editors • Design Web page to describe web skeleton • Demonstrate Text formatting • Create list and insert image • Create hyper link • Create table • Create Form • Create page with multimedia contents
Unit 2: Cascading Style Sheet	• Use inline CSS • Use internal CSS • Use external CSS • Apply CSS selectors to select HTML elements • Design Text formatting • Create Fixed and Liquid page layouts
Unit 3: Client Side Programming with JavaScript	• Demonstrate data types and variables • Use function to accept the information • Demonstrate control structure • Apply JavaScript objects: array, string, date, window, document • Demonstrate events handling • Validation of form data
Unit 4: Server Side Programming with PHP	• Use PHP variables and constants • Create decision making programs using control statements • Demonstrate use of array functions, string functions, date functions and file handling functions
Unit 5: Working with Web Form	• Design and develop web forms to collect user data • Store the collected data in CSV file • Read CSV file and display data

Unit 6: Database and PHP	• Create a database connection • Insert, update, delete and retrieve data through PHP • Use session and cookie variable to memorize visitors • R/W CSV file from/to reflect database
Unit 7: Project Work Assignment	• Prepare and Involve students to design and develop web application using HTML, CSS, JavaScript, PHP and database.

5. Evaluation

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

Internal Assessment Theory	Internal Assessment Practical	Semester Examination (Theoretical exam)	External Practical Exam/Viva	Total Points
25 Points	15 Points	40 Points	20 Points	100 Points

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

5.1 Internal Assessment (25 Points) of Theoretical Part

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

Attendance and learning Activities	5 points
First assignment (Written assignment)	5 points
Second assignment (Project work with presentation)	10 points
Third assignment/written examination	5 point
Total	25 points

5.2 Internal Assessment (15 Points) of practical part

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

Attendance and learning Activities	5 points
Practical work/project work/lab work	10 points
Total	15 points

5.3 Semester Final Examination (40 Points) theoretical part

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

Objective question (Multiple choice questions 10 x 1 point)	10 Points
Subjective questions (6 questions x 5 marks with 'OR" two questions)	30 Points
Total	40 points

5.4 Practical Exam/Viva (20 Points)

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

Examination Division, Office of the Dean will appoint an external examiner (ICT teachers working another campus) for conducting practical examination

Items	Points
Evaluation of Record Book	4
Project work/practical work presentation/skill test	10
Viva	6
Total	20

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

Recommended Books:

Kyrnin, J. & Meloni, J.C. (2019). *Sams teach yourself HTML, CSS and JavaScript All in One* (3rd Ed.). Pearson.

Nixon, R. (2021). Learning PHP, MySQL & JavaScript: A Step-by-Step Guide to Creating Dynamic Websites (6th Ed.). O' Really Media.

Sklar, D. (2004). *Learning PHP 5 (1st Ed.)* O' Really Media.

Course Title: 21st Century Skills
Course No.: ICT. Ed. 438
Level: Bachelor.
Semester: Third

Program: BICTE
Nature of course: Theoretical
Credit Hour: 3 hours
Teaching Hour: 48 hours

5. Course Description

The aim of the course is to help students on 21st Century skills that today's students need to succeed in their careers during the Information Age. After the learn and practices of Critical thinking, Creativity, Collaboration, Communication, Media literacy, Flexibility, Leadership, cross-culture adaptation skills, the student will be able to develop and deepen their professional and general competences, to use innovative teaching tools and techniques as well as facilitate classroom.

6. General Objectives

After the completion of this course, the students should be able to:-

- To explore the different dimension of 21st century skills and practices.
- To able to demonstrate critical thinking and problem solving skill toward the new creation in classroom.
- To able establish the collaboration and communication teaching learning environment.
- To build skill to e-leadership and self-directed learn abilities.
- To explore the cross-culture practices on 21st CS and ready to cope up with learning environment.

7. Course Outlines:

Specific Objectives	Contents	
• Describe the concept of 21st CS skills. • Explain the 21st CS component of 4C, IMT and FLIPS. • Define the ATCs 21 CS Skills.	**Unit I: Introduction to 21st CS** 1.9 Definition of 21st CS 1.10 Components of 21st CS: 4C, IMT, FLIPS 1.11 National Curriculum framework and 21st CS 1.12 ATC21s 21st Century Skills 1.13 Broad Outcomes of 21st Century Skills	8
• Explore the different levels arguments. • Apply the rational discussion into critical thinking process. • Demonstrate a critical thinking activity in classroom. • Explain a creativity and innovation. • Demonstrate the creative and innovative activities in classroom.	**Unit II: Critical Thinking, Creativity and Innovation** 2.10 Concept of argument 2.11 Example of good vs bad argument 2.12 Rational discussion and reply rationally to an argument 2.13 Deductive arguments vs non-deductive arguments 2.14 Critical thinking activities in classroom 2.15 Concept of innovation and creativity 2.16 Creativity, innovation and learning 2.17 Classroom Activities of creativities and innovation 2.18 Classroom Activities on creativity and innovation	12

• Explain basic component of communication. • Define the types of communication. • Explain the different mode of collaboration. • Explain the media literacy for learner • Demonstrate the application for create, publish, share learning materials	**Unit III: Communication, collaboration and media literacy** 7.1 Component of Communication 7.2 Types of communication media 7.3 Concept of collaboration 7.4 Social media and collaboration practices 7.5 Classroom collaboration 7.6 Concept of media literacy for learner 7.7 Digital citizen and netiquettes 7.8 Application of create, publish, share audio, video materials. 7.9 Classroom activities on publishing students portfolios in online	12
• Define the 21st Century e-Leadership. • Describe the flexibility and adaptability in learning environment. • Explain the self-direct learner characteristics	**Unit IV: e-Leadership and Responsibility** 4.8 Concept of e-leaderships in education 4.9 Characteristics of 21st Century leadership 4.10 Learning flexibility and adaptability 4.11 Self-directed leader 4.12 Self-director learning classroom activities 4.13 Classroom activities on 21st Century leadeship	6
• Define the social and cross-culture learning environment. • Explore the ethical issues in cross-culture learning environment.	**Unit V: Social and Cross-Cultural Interaction** 5.1 Concept of digital culture and global villages 5.2 Ethical issues of cross culture interaction 5.3 Privacy and freedom of expression in digital world 5.4 Cultural difference and Privacy 5.5 Classroom Activities on ethical issues, privacy and freedom of expression on online beahaviours.	6
• Analyze the practices of 21st CS skills in education system.	**Unit VI:** CASE Study on critical thinking, creativity and innovation and collaboration practices in classroom using digital technology.	4

7 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 specific units.

7.1 General Instructional Techniques

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

7.2 Specific Instructional Techniques

Unit	Suggested specific Instructional Techniques
I	• Students are divided into gender disaggregated groups. Each group is assigned to prepare key aspects 4C, IMT, FLIPS 21st CS skills. The students will present the

	group work in the class.
II, III, IV, V	• Students are divided into groups. The groups will visit a nearby school, observe a class and assess which 21st CS Skills teachers are using. Each group prepares a report and present in the class.
VI	• Students work in pair and discuss different case study about 21st CS and drawn the educational implications from 21st CS for classroom teaching in their computer science areas.

8 Evaluation

5.2 Internal Evaluation 40%

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

6) Attendance	5
7) Class participation	5
8) First assignment (Group work based on unit I, II, III, IV,V)	10
9) Second assignment (Pair work based on Unit VI)	10
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.

Objective type question (Multiple choice 10 x 1ponts)	10
Short answer questions with two OR option (6 questions x 5 points)	30
Long answer questions with one OR option (2 questions x 10 points)	20
Total	60

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

Recommended books:

21st Century Skills : A Handbook, Central Board of Education, Delhi, 2020

References materials:

Walter Sinnott Armstrong and Robert Fogelin, Understanding Arguments: An Introduction to Informal Logic. 8th Ed. Wadsworth Cengage Learning.

Bellanca, J. A. (Ed.). (2015). *Deeper learning: Beyond 21st century skills*. Solution Tree Press.

Lamri, J. (2019). *The 21st century skills: How soft skills can make all the difference in the digital era.*

Course Title: Computer Architecture and Organization **Program: BICTE**

Course No. : ICT. Ed. 439 Nature of course: Theoretical + Practical

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

Semester: Third Teaching Hour: 64 hours (32+32)

---

1. Course Description

This course is an introduction to Computer Architecture and its Organization. It covers topics in physical design of the computer (i.e. computer organization). This course discusses the basic structure of a digital computer and deals with the detail study of data representation in computer system, Register transfer language and microoperations, and organization of the Control unit, the Arithmetic and Logic unit, the Memory unit and the I/O unit.

2. General Objectives

The general objectives of this course are as follows:

- To provide the students with the knowledge of data representation, register transfer language and microoperations
- To provide the organization and designing concept of computer system including processor, computer arithmetic, memory organization and I/O organization.
- To discuss in detail, the operation of the arithmetic unit including the algorithm to add, subtract and multiply signed magnitude data and signed 2's complement data.
- To study the multiprocessors and pipelining.
- To study the different ways of communicating with I/O devices and standard I/O interfaces

3. Course Outlines:

Specific Objectives	Contents	LH
• Explain different data types representation • Define the requirement of complement numbers	**Unit 1: Data Representation** 1.1 Data Types 1.2 Complements 1.3 Fixed Point Representation 1.4 Floating Point Representation **Practical Works** **1.1 Computer Program:** Write program to visualize the representation of complement numbers, integers, floating point numbers and character data, overflow detection while adding integers.	4
• Explain register transfer language • Apply different microoperations to perform specific task	**Unit 2: Register Transfer and Microoperations** 2.1 Register and Register Transfer Language 2.2 Bus and Memory Transfers 2.3 Arithmetic, Logic and Shift Micro-operations 2.4 Arithmetic Logic Shift Unit	8

प्राज्ञिक परिषद् कार्यालय
कीर्तिपुर

Faculty of Education
Office of the Dean
Balkhu

• Explain instruction codes • Describe instruction format and instruction cycle • Design component organization in basic computer.	**Unit 3: Basic Computer Organization and Design** 4. Instruction Codes 5. Computer Registers 6. Computer Instructions 7. Timing and Control 8. Instruction Cycle 9. Input Output and Interrupt **Practical Works** **3.1 Circuit Design:** Design of Basic Computer 3.2 **Computer Program:** Write program to illustrate fetch, decode and execute instructions.	8
• Describe control memory and its usage • Apply address sequencing concept • Identify microinstruction format	**Unit 4: Microprogrammed Control** 4.1 Control Memory 4.2 Address Sequencing 4.3 Computer Configuration 4.4 Microinstruction Format	6
• Explain different CPU organizations • Describe the requirement of different instruction formats • Understand and apply addressing modes	**Unit 5: Central Processing Unit** 5.1 CPU Organizations 5.2 Instruction Formats 5.3 Addressing Modes **Practical Works** **5.1 Computer Program:** Write program to illustrate the use of different addressing modes.	6
• Define different types of computers • Explain pipelining • Utilizing different types of pipelining to improve performance • Understand pipeline hazards and suggest their solutions	**Unit 6: Pipelining** 6.1 Parallel Processing, Flynn's Classification of Computers 6.2 Pipelining 6.3 Arithmetic Pipeline 6.4 Instruction Pipeline 6.5 Pipeline Hazards and their Solutions 6.6 Array and Vector Processing **Practical Works** 6.1 **Case Study**: Available array and vector processors and their application domain 6.2 **Computer Program**: write program which simulates instruction pipeline and arithmetic pipeline.	8
• Demonstrate the addition and subtraction of signed magnitude data and signed 2's complement data • Trace Multiplication algorithms to multiply signed magnitude and signed 2's complement	**Unit 7: Computer Arithmetic** 7.1 Addition and Subtraction of Signed Magnitude Data 7.2 Addition and Subtraction of Signed 2's Complement Data 7.3 Multiplication of Signed Magnitude Data 7.4 Multiplication of Signed 2's Complement Data	8

data.	**Practical Works** 7.1 **Computer Program:** Implement all algorithms learned in this chapter in high level language.	
• Explain I/O interface, async. data transfer, modes of transfer • Demonstrate interrupt handling and DMA transfer • Identify the need of IOP	**Unit 8: Input and Output Organization** 8.1 I/O Interface 8.2 Asynchronous Data Transfer 8.3 Modes of Transfer 8.4 Priority Interrupt 8.5 Direct Memory Access 8.6 I/O Processor **Practical Works** **8.1 Case Study:** USB (universal serial bus)	6
• Describe the concept of memory hierarchy • Explain associative memory organization and cache mapping techniques	**Unit 9: Memory Organization** 9.1 Memory Hierarchy 9.2 Main Memory 9.3 Associative Memory 9.4 Cache Memory **Practical Works** 9.1 **Computer Program**: write program to simulate associative memory (key value pair mapping) implementation.	5
• Specify the use of multiprocessor • Demonstrate interconnection structures of processors and IPC • Identify cache coherence problem with its solution	**Unit 10: Multiprocessors** 10.1 Characteristics of Multiprocessor 10.2 Interconnection Structures 10.3 Inter Processor Communication and Synchronization 10.4 Cache Coherence **Practical Works** 10.1 **Computer Program**: write program to simulate cache coherence problem and its solution.	5

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 particular units.

4.1 General Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of multi-media projector, 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. The details of suggested instructional techniques are presented below:

Unit 2 and 4: Lecture, Discussion

Unit 1, 3, 5, 6, 7, 8, 9 and 10: Lecture, Discussion, Practical

5. Evaluation

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

Internal Assessment Theory	Internal Assessment Practical	Semester Examination (Theoretical exam)	External Practical Exam/Viva	Total Points
25 Points	15 Points	40 Points	20 Points	100 Points

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

5.1. Internal Assessment (25 Points) of Theoretical Part

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

Attendance and learning Activities	5 points
First assignment (Written assignment)	5 points
Second assignment (Project work with presentation)	10 points
Third assignment/written examination	5 point
Total	25 points

5.2. Internal Assessment (15 Points) of practical part

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

Attendance and learning Activities	5 points
Practical work/project work/lab work	10 points
Total	15 points

5.3. Semester Final Examination (40 Points) theoretical part

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

Objective question (Multiple choice questions 10 x 1 point)	10 Points
Subjective questions (6 questions x 5 marks with 'OR" two questions)	30 Points
Total	40 points

5.4. Practical Exam/Viva (20 Points)

Examination Division, Office of the Dean will appoint an external examiner (ICT teachers working another campus) for conducting practical examination

Items	Points
Evaluation of Record Book	4
Project work/practical work presentation/skill test	10
Viva	6
Total	20

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

Recommended books:

1. Mano, M. M. (2003), *Computer System Architecture*, (3rd Ed.), Prentice Hall of India.
2. Stalling, W. (2016), *Computer Organization and Architecture: designing for performance* (10th Ed.), Pearson Education.
3. Tanenbaum, A.S. (2013), *Structured Computer Organization*, (6th Ed.), Pearson Education.

Course Title: Data Structures and Algorithms Program: BICTE

Course No. : ICT. Ed. 435 Nature of course: Theoretical + Practical

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

Semester: Third Teaching Hour: 64 hours (32+32)

---

1. Course Description

The purpose of this course is to provide the students with solid foundations in the basic concepts of data structures and algorithms. The main objective of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might occur. This course is also about showing the correctness of algorithms and studying their computational complexities. This course offers the students a mixture of theoretical knowledge and practical experience. Programming language C will be used for practical work.

2. General Objectives

The general objectives of this course are as follows:

- To introduce data abstraction and data representation in memory
- To describe, design and use elementary data structures such as stack, queue, linked list, tree and graph
- To decompose complex programming problems into manageable sub-problems
- To introduce algorithms and their complexity

3. Specific Objectives and Contents

Specific Objectives	Contents	LH
• Define Data structure and ADT • Define algorithms and its types and asymptotic notations	**Unit 1: Introduction to Data Structures & Algorithms** 1.1 Data type and Abstract data types 1.2 Data structures : linear and non-linear, static and dynamic 1.3 Algorithms 1.3.1 Greedy algorithm 1.3.2 Divide and Conquer 1.3.3 Backtracking 1.3.4 Randomized algorithms 1.4 Analysis of Algorithms 1.4.1 Big O notation and its rule	5
• Demonstrate relationship between array and pointer • Implement structure	**Unit 2: Arrays, Pointers and Structures** 2.1 Array and Pointer	6

pointers and self-referential pointer • Allocate memory dynamically using malloc, calloc, realloc and free functions	2.2 Structure and Pointer 2.2.1 Structure pointer 2.2.2 Self-referential pointer 2.3 Dynamic Memory Allocation: malloc, calloc, realloc, free **Practical Works** 2.1 Write program to illustrate memory allocation dynamically.	
• Define linked list its type and applications • Implement different types of linked list with its operations • Make comparison between array list and linked list	**Unit 3: Linked Lists** 3.1 Single Linked list: traversing, searching, inserting and deleting in single linked list 3.2 Doubly Linked List: traversing, inserting, creating and deleting in doubly linked list 3.3 Circular Linked List: traversing, inserting, creating and deleting in circular linked list 3.4 Comparison of Array list and Linked list **Practical Works** 3.1 Write a program to implement singly, doubly and circular linked list operations	8
• Define and implement stack and stack operations • Convert expressions in to different forms: infix, prefix and postfix • Describe the applications of the stack	**Unit 4: Stack** 4.1 Introduction 4.2 Array Implementation of Stack 4.3 Linked List Implementation of Stack 4.4 Applications of Stack 4.4.1 Conversion from infix to postfix expression 4.4.2 Evaluation of postfix expressions **Practical Works** 4.1 Write program to create stack with array and linked list implementation 4.2 Write program to illustrate expression conversion and expression evaluation	6
• Define queue and its operations • Implement different types of queue	**Unit 5: Queue** 5.1 Introduction 5.2 Array Implementation of Queue 5.3 Linked List Implementation of Queue	6

	5.4 Circular Queue 5.5 Priority Queue. **Practical Works** 5.1 Write a program to implement linear, circular and priority queue with array and linked list	
• Define recursion. • Differentiate between recursion and iteration • Implement recursion to solve TOH and Fibonacci series	**Unit 6: Recursion** 6.1 Introduction 6.2 Examples of Recursion: factorial, fibonacci sequence, Tower of Hanoi(TOH) 6.3 Applications and Efficiency of recursion **Practical Works** 6.1 Write a program to solve the problem of TOH 6.2 Write a program to print Fibonacci series 6.3 Write a program to calculate factorial	4
• Define tree and tree operations • Create and manipulate Binary tree, BST, AVL tree	**Unit 7: Trees** 7.1 Introduction 7.2 Binary Tree : Construction, Traversal (pre-order, in-order, post-order) 7.3 Binary Search Tree: Construction, Traversal 7.4 AVL tree: Construction, Traversal 7.5 Heap: Building a heap **Practical Works** 7.1 Write program to implement binary tree. 7.2 Write program to implement binary search tree 7.3 Write program to implement AVL tree	8
• Define sorting and its type • Demonstrate hashing • Illustrate and implement bubble, selection, insertion, merge, quick and heap sort. • Implement searching algorithms • Identify and compare the efficiency of mentioned sorting algorithms	**Unit 8: Searching, Sorting and Hashing** 8.1 Introduction 8.2 Sequential and Binary Search 8.3 Hashing: Hash function (truncation, division method, folding, midsquare) 8.4 Hash collision and resolution techniques 8.5 Sorting Algorithms: Bubble, Selection, Insertion, Merge, Quick and Heap Sort 8.6 Efficiency of Sorting Algorithms **Practical Works**	15

	8.1 Write program to implement: a) Bubble sort b) Selection sort c) Insertion sort d) Quick sort e) Merge sort f) Heap sort 8.2 Write program to implement searching algorithms: binary search and linear search 8.3 Write program to implement hash function.	
• Define graph and graph terminologies • Explain and implement graph traversal algorithms • Find the shortest path using Dijkstra's Algorithm • Define MST and implement kruskal's	**Unit 9: Graphs** 9.1 Graph Terminology 9.2 Directed and undirected graph 9.3 Graph Traversal: BFS and DFS 9.4 Minimum Spanning Trees: Kruskal Algorithm 9.5 Shortest Path Algorithms: Dijkstra's Algorithm **Practical Works** 9.1 Write a program to implement graph traversal algorithms : BFS and DFS 9.2 Write program to implement Kruskal algorithm and Dijkstra's algorithm	6

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 particular units.

4.1 General Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of multi-media projector, brain storming, and problem solving methods 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. The details of suggested instructional techniques are presented below:

Units	Activities

Unit 1: Introduction to Data Structures & Algorithms	• Define and Describe the different types of data structures • State different operations occurring in data structures • Write a program to implement dynamic memory management functions • Explain asymptotic notations and complexity on time and space of algorithm • Monitor of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 3: List	• Demonstrate operations of linked list with algorithms • Lab work in pairs to implement linked list operations • Monitor students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 2, 4: Array, Pointer and Structure, Stacks	• Illustrate array, pointer and structure of C language • Illustrate the algorithms of stack operations • Lab works in pair to implement stack operations • Convert expression in other from one form to another making group and individually • Monitoring of students' work by reaching each pair and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 5: Queues	• Demonstrate queue and queue operations with algorithms • Lab work in pairs to implement queue operations • Group discussion in advantages and limitations of queues • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 6, 7: Recursion, Trees	• Apply recursive function to calculate factorial, solve TOH problem and generate Fibonacci series • Demonstrate operations and types of tree • Lab work in pairs to implement BST • Trace a working principle of AVL • Assign students to create AVL • Monitor students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 8: Searching, Sorting and Hashing	• Demonstrate the working principle of different searching algorithms • Lab work in pair to implement searching algorithms • Implement Hashing • Trace the working principle of different sorting algorithms • Lab work in pair to implement sorting algorithms

	• Analyze efficiency of sorting algorithms • Monitor students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback
Unit 9: Graphs	• Explain the graph and graph terminology • Solve the practical problems of shortest path and spanning tree using different algorithms • Assign student to solve graph problems • Lab work in pair to implement graph traversing algorithms • Monitor students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback

5. Evaluation

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

Internal Assessment Theory	Internal Assessment Practical	Semester Examination (Theoretical exam)	External Practical Exam/Viva	Total Points
25 Points	15 Points	40 Points	20 Points	100 Points

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

5.1 Internal Assessment (25 Points) of Theoretical Part

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

Attendance and learning Activities	5 points
First assignment (Written assignment)	5 points
Second assignment (Project work with presentation)	10 points
Third assignment/written examination	5 point
Total	25 points

5.2 Internal Assessment (15 Points) of practical part

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

Attendance and learning Activities	5 points
Practical work/project work/lab work	10 points
Total	15 points

5.3 Semester Final Examination (40 Points) theoretical part

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

Objective question (Multiple choice questions 10 x 1 point)	10 Points
Subjective questions (6 questions x 5 marks with 'OR" two questions)	30 Points
Total	40 points

5.4 Practical Exam/Viva (20 Points)

Examination Division, Office of the Dean will appoint an external examiner (ICT teachers working another campus) for conducting practical examination

Items	Points
Evaluation of Record Book	4
Project work/practical work presentation/skill test	10
Viva	6
Total	20

Recommended Books and References

Recommended Books

1 Srivastava, S.K. & Srivastava, D. (2011). *Data structure Through C in Depth*, (2nd Ed.), BPB Publication

2 Langsam, Y., Augenstein, M.J. & Tenenbaum, A.M., *Data Structures using C*, Prentice Hall India.

प्राविक परिषद्को कार्यालय
कीर्तिपुर

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

Course Title: Probability and Statistics
Course Title: Math. Ed. 436
Level: Bachelor's Degree

Nature of Course: Theory
Credit Hour: 3
Total Period: 48 hour

1. Course Description

This is an integrated course of probability and statistics for students with bachelor's degrees in Information and Communication Technology (BICTE). This course provides a foundation for the students to understand the basic concept of mathematics to be applicable in the field of technology. The main aim of this course is to develop an in-depth understanding of different aspects of probability and statistics. This course covers correlation and regression, probability distributions, sampling distributions, estimation of parameters, and hypothesis testing.

2. General Objectives

The general objectives of this course are as follows:

- To impart practical knowledge and skills in deriving properties of correlation and regression and applying them to solve problems.
- To make the students familiar with random variables, and different discrete and continuous probability distributions.
- To make the students able to use sampling distribution and estimation of parameters, and use test of hypothesis in research work.

3. Specific Objectives and Contents

Unit	Objectives	Contents
I	• Define correlation and describe its types. • Interpret the different values of r. • Compute Pearson's moment correlation and writes its properties	Unit I: Correlation (4) • Types of correlation • Computation of correlation coefficient (r) and its interpretation, • Rank correlation, • Properties of correlation.
II	• Define regression and describe its types • Find the equation of regression and its properties • Write the relation between correlation and regression.	Unit II: Regression (6) • Types of relationship • Estimation of regression equations, • Properties of regression equations • Relationship between correlation and regression.
III	• Explain sample space, events, probability of an event, Axioms	Unit III: Probability Distribution (9)

	of probability, • State and prove Baye's theorem., • Define discrete random variables, probability function, probability distributions, cumulative distribution, moments, mean, and variance. • State uniform distribution and write its properties • State Binomial distributions and write their properties. • Define a continuous random variable, probability density, cumulative density, mean and variance, • State and prove Chebychev's inequality Describe laws of large numbers	• Basic terms of Probability. • Axioms and theorems of probability • Conditional probability & Baye's theorem. • Discrete random variable, probability function, probability distributions, cumulative distribution, moments, mean, and variance. • Uniform distribution and its properties, • Binomial distributions and their properties. • Continuous random variable, probability density, cumulative density, mean, and variance. • Chebychev's inequality and laws of large numbers.
IV	• State normal distributions and writes its properties. • Calculate the area under the standard normal curves, Z score • Derive the normal approximations to the binomial distribution.	Unit IV: Normal distributions (4) • Measure of Divergence from Normality • Properties: mean and variance, • Area under the standard normal curves • Z score
V	• Define parameters and statistics • Explain sampling distribution of the mean, variance, standard error of statistics, and central limit theorem. • Define point and interval estimation. • State the properties of point estimation. • Compute the confidence interval for mean and variance.	Unit V: Sampling Distribution and Estimation (8) • Parameter and statistics, sampling distribution of mean/variance • Application of the central limit theorem • Estimation: Point estimation, interval estimation, • Confidence interval for mean and variance.
VI	• Define null and alternate hypotheses. • Identify one-tailed, two-tailed test, Type I, and Type II errors. • Set level of significance and calculate critical region. • Identify test statistics and describe sequential steps of	Unit VI: Test of Hypothesis (17) • Basic concepts. • Null/ Alternative hypothesis. • One-tailed / two-tailed tests • Type I / Type II errors • Level of significance, Critical region, and Test statistics

	hypothesis testing. • Solve test of hypothesis for the difference between two means of large samples with unknown population variance. • Solve the Difference between two means of small samples with unknown common variance, the significance test of independence	• Steps in hypothesis testing. • Z-test: the difference between two means of large samples with unknown population variance. • T-test: difference between two means of small samples with unknown common variance. • Chi-square test: significance test of independence.

4. Specific Instructional Techniques

The specific teaching and learning techniques chapter wise are listed below:

Unit	Activity and Instructional Techniques	Teaching Hours (48)
I	Lecture, discussion in group and question answer	4
II	Lecture, discussion in group and question answer	6
III	Lecture, discussion in group and question answer	9
IV	Lecture, discussion in group and question answer	4
V	Lecture, discussion in group and question answer	8
VI	Lecture, discussion in group and question answer	17

5. Evaluation

5.1 **Internal Evaluation** 40%

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

Attendance	4 marks
Participation in learning activities	6 marks
First assignment	10 marks
Second assignment	10 marks
Third assignment	10 marks
Total	40 marks

5.2 **External Evaluation** (60%)

प्राविक प्रशासन कार्यालय कीर्तिपुर

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

The examination section Dean Office, Faculty of Education will conduct the final examination at the end of the first semester. The type of questions and marks allocated for each question will be as follows:

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

6 Recommended Books

Freund J. E. (1997): Modern elementary Statistics, New Delhi: Prentice Hall of India

Garrett, H. E. (). *Statistics in psychology and education.* Longmans, NY: Green and Co. Inc.

Hayslett, H. T (1983): *Statistics Made Simple*, Heinemann: London

7. References

Mendenhall, W, Scheaffer, R. L. and Wackerly, D. D. (1987): *Mathematical Statistics with Applications.* Boston: PWS Publishers.

Wallpole, R. (1979): *Introduction to Statistics*, Delhi: Macmillan, India

Pandit, R. P. and Bhattarai, L. N. (2016). *Mathematical Statistics,* Kathmandu: Indira Pandit

Pandit Pandit, R. P. and Pahari, S. (2016): *Modern Elementary Mathematics*, Kathmandu: Indira Pandit

प्राज्ञिक परिषद्को बैठक
कीर्तिपुर

Faculty of Education
Office of the Dean
Balkhu, Kathm

BACHELOR OF INFORMATION AND COMMUNICATION TECHNOLOGY EDUCATION (BICTE)

Curriculum

Fourth Semester

List of Subject

Course title: Fundamental of Curriculum

Course No. : Ed·442 Nature of Course: Theoretical

Level: B.Ed. Credit Hours: 3

Semester: Fourth Teaching Hours: 48

1. **Course Description**

This course is designed for providing students with fundamental concept of curriculum and curriculum development. The course intends to equip students with knowledge on the bases of curriculum development and its components. Further, it aims at providing students with general understanding of the process of curriculum development and study of existing school level curriculum of Nepal.

2. **General Objectives**

The general objectives of this course are listed below:

- To acquaint students with different meanings of curriculum.
- To make students familiar with various bases of curricular decisions.
- To enable students to figure out various components of curriculum.
- To make students familiar with the curriculum development process and existing school level curriculum of Nepal
- To equip students with skill of preparing some components of curriculum.

3. **Specific Objectives and Contents**

Specific Objectives	Contents
• Explain different meanings of curriculum.	**Unit 1: Introduction to Curriculum (5)** 1.1. Curriculum as subject 1.2. Curriculum as courses of study and syllabus 1.3. Curriculum as experiences 1.4. Curriculum as objectives 1.5. Curriculum as plan of learning.
• Identify bases for curricular decisions. • Relate different philosophical bases with curriculum. • Justify the need of studying society and culture for curriculum development. • Exemplify socio-cultural factors to be addressed by curriculum. • Identify various nature of knowledge. • Elucidate how nature of knowledge influences the curricular decisions. • Clarify why need, interest and maturation of child should be addressed by curriculum • Explore ways of addressing the need	**Unit 2: Bases for Curricular Decision Making (17)** **2.1 Philosophical bases** 2.1.1 Philosophy and curriculum 2.1.2 Idealism and curriculum. 2.1.3 Naturalism and curriculum. 2.1.4 Pragmatism and curriculum. 2.1.5 Realism and curriculum **2.2 Society and culture** 2.2.1 Society, culture and curriculum 2.2.2 Socio-cultural factors influencing curricular decisions **2.3 Nature of knowledge** • Knowledge as contents and process. • Levels of contents • Explosion and obsolescence of knowledge. **2.4 Nature of learner**

of children with special needs.	• Need, interest and maturation level • Learning needs of children with special needs.
• Explain aims, goals and objectives of curriculum. • Construct goals and objectives for various subjects. • Describe the criteria of selection and organization of content and learning experiences. • Justify the need of assessment / evaluation of student learning	**Unit III: Curricular Components (17)** 2.3 Aims, goals and objectives • Concepts and relationship • Types of objectives: general and specific • classification of objectives: cognitive, affective and psychomotor 2.4 Content: selection and organization 2.5 Teaching-learning experiences • Criteria of selecting and organizing Learning Experiences • Teacher initiated and learner initiated experiences 2.6 Evaluation /assessment of student learning
• Identify the steps of curriculum development. • Describe the process of school curriculum development in Nepal.	**Unit 4: Process of Curriculum Development (5)** 4.1 Concept of Curriculum Development. 4.2 Steps of Curriculum Development. 4.3 School level Curriculum Development Process in Nepal.
• Assess the structure, goals, learning outcomes, teaching methods and evaluation process stated in the existing school curriculum of Nepal.	**Unit 5: Existing School Level Curriculum of Nepal (5)** 5.1. Level wise goals: Pre-Primary, Basic and Secondary 5.2. Structure of curriculum of each level 5.3. Components of subject-wise curriculum: • *Introduction* • *Level wise competencies* • *Grade wise learning outcomes* • *Skills/ scope and sequence and elaboration of contents* • *Facilitation Process for learning* • *Assessment of student achievement* 5.4. Review of school curriculum of Nepal

Note: The figures in the parentheses indicate approximate teaching hours for respective units.

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

4. Instructional methods

Two modes of instruction, general and specific, can be applied. General mode consists of techniques applicable to most of the contents whereas, specific ones are applicable to specific contents.

4.1. General Methods

This method requires following activities:

a) Introductory presentation on each topic of the unit by teacher.
Lecture, discussion, question-answer, argumentative sessions.

b) Presentations by students.

4.2 Specific Methods

a) Unit II: Society and culture

- The students will be involved in discussion, brainstorming on the nature of Nepalese society and culture and explore the aspects to be addressed by curriculum. Presentation of the outcomes in the classroom followed by feedback.
- Prepare an outline of some components of curriculum in subject of your interest.

b) Unit IV: Process of Curriculum Development

- The students will consult concerned agency such as CDC and find out the process of school level curriculum development.
- Presentation and discussion on pros and cons of curriculum development process in the classroom.

Unit V: Existing school level curriculum of Nepal

- Group assignment on identifying structure of school curriculum.
- The students will visit the school and observe the transaction of curriculum in classroom.

5. Evaluation

5.1 Internal Evaluation 40%

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

1) Attendance	5
2) Class participation	5
3) First assignment (Group work based on unit I, II, III & IV)	10
4) Second assignment (Pair work based on Unit V)	10
5) 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.

Objective type question (Multiple choice 10 x 1ponts)	10
Short answer questions (6 questions with 2 OR x 5 points)	30
Long answer questions (2 questions with 1 OR x 10 points)	20
Total	60

6. Recommended Books and references

Recommended Books

Government of Nepal (2063 BS). *Primary Education Curriculum Grade 1-3 (Nepali Version)* , Sanothimi, Bhaktapur. Curriculum Development Center (UNIT V)

Government of Nepal (2065 BS). *Primary Education Curriculum Grade 3-4 (Nepali Version)* , Sanothimi, Bhaktapur. Curriculum Development Center (Unit V)

Government of Nepal. (2069 BS). *Basic Education curriculum Grade 6-8.* Sano thimi Bhaktapur. Curriculum development Center. (Unit V)

Government of Nepal (2063 BS). *National Curriculumk framework (Nepali Version)* , Sanothimi, Bhaktapur. Curriculum Development Center (UNIT IV)

Government of Nepal (2064 BS). *Local Curriculum Development Manual (Nepali Version),* Sanothimi, Bhaktapur. Curriculum Development Center (UNIT IV)

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

Ornstein, Allan and Hunkins, Francis P., (2004) *Curriculum: Foundations, principles and Issues.* Boston, USA, Allyn and Bacon (UNIT II).

Saylor.J. Galen and Alexander.William M. (1974*) Planning curriculum for schools.* New York, USA . Holt, Rinehart and Winston, Inc.(UNIT I)

Taba, Hilda (1962) *Curriculum Development, Theory and Practice* New York Harcourt, Brace & Inc.(UNIT II , III and IV)

Tyler. Ralph W.(1974) *Basic Principles of curriculum and Instruction.* Chicago , USA. The University of Chicago. (UNIT III)

Wheeler, D.K. (1979) *Curriculum Process.* London, Great Britain Hodder and Stougton(NIT II and IV)

References

Print, Murray. (1988) . *Curriculum Development and Design.* NSW Australia. Allen and Unwin.

Ross S. James (2008) *Groundwork of Educational Theory* New Delhi India, Surjeet Publication.

Sowell, Evelyn J. (1996). *Curriculum: An Integrative introduction.* New Jersy, Prentice Hall Inc.

Tanner, D. & Tanner, L.N. (1980) *Curriculum development, theory into practice*, 2nd edition, New York: Macmillan Publishing Co., Inc.

Zais, Robert S. (1976). *Curriculum: Principles and Foundations.* New York. USA Harper and Row, Publishers.

Course Title: Educational Leadership in Digital Era **Program: BICTE**

Course No.: ICT. Ed. 444 Nature of course: Theoretical

Level: Bachelor. Credit Hour: 3 hours

Semester: Fourth Teaching Hour: 48 hours

---

1. Course Description

The aim of the course is to prepare students for leadership roles in the field of education by providing them with the knowledge, skills, and strategies necessary to effectively manage and lead educational institutions. Students will also develop their leadership and communication skills through a variety of interactive activities, case studies, and real-world experiences. Upon completion of the course, students will be equipped with the tools and knowledge necessary to successfully lead and manage educational institutions and improve student outcomes.

2. General Objectives

After the completion of this course, the students should be able:

- To provide students with a comprehensive understanding of the principles and practices of educational leadership and management
- To develop students' skills in educational administration and management, including curriculum development, instructional leadership, and school improvement
- To improve students' leadership, communication and decision-making skills through interactive activities, case studies, and real-world experiences
- To equip students with the tools and knowledge necessary to successfully lead and manage educational institutions and improve student outcomes

3. Course Outlines:

Specific Objectives	Contents	
• Describe the concept of leadership management. • Justify the role of educational leadership • Debate on leaders are born or made. • Reflect leadership characteristic of some great leaders • Explain concept of digital leadership	**Unit I: Introduction to Educational Leaderships** 1.1 Definition of leadership and management 1.2 Leaders born or made 1.3 21st century leader V/s classical leader 1.4 Leadership for Digital transformation in Education 1.5 Some great leaders a case study: Mahatma Gandhi, Nelson Mandela, Maria Montessori, Mother Teresa, Mark Zuckerberg	6

	1.6 Concept of Digital Leadership	
• Explore the transformational leadership framework and practices • Define the nature of instructional, constructive and strategical leadership. • Compare working style of digital leadership	**Unit II: Leaderships theory and styles** 2.1 Transformational Leadership: 4I's 2.2 Instructional leadership 2.3 Constructivist leadership 2.4 Strategic leadership 2.5 Agile and Digital Leadership	6
• Explain basic communication methods. • Demonstrate the techniques and skills of presentation and public speaking. • Describe cross-culture communication. • Show interpersonal communication skills • Explore time management skills	**Unit III: Communication and Interpersonal Skills** 3.1 Verbal, Written and Symbolic(emoji) communication 3.2 Presentation skills and Public speaking 3.3 Cross-cultural communication 3.4 Emotional intelligence 3.5 Interpersonal communication 3.6 Time Management and Mind Management	6
• Define different decision making models. • Demonstrate root cause analysis techniques. • Describe data analysis and interpretation methods • Describe creativity and innovative idea for problem solving. • Explain design thinking process	**Unit IV: Decision Making and Problem Solving** 4.1 Decision-making models 4.2 Root cause analysis 4.3 Data analysis and interpretation 4.4 Problem-solving frameworks 4.5 Creativity and innovation 4.6 Strategic thinking and risk management 4.7 Design Thinking (Discovery, Interpretation, Ideation, Experimentation and Evolution)	8
• Define different motivational theories. • Explore engagement, empower and provide autonomy techniques to employee. • Build team for remote and virtual mode • Define team building strategies. • Set the coaching and mentoring process. • Explore the performance management system	**Unit V: Motivation and Team Building** 5.1 Theories of Motivation 5.2 Employee engagement, empowerment and autonomy 5.3 Remote work and virtual teams 5.4 Team Building Strategies 5.5 Coaching and mentoring 5.6 Performance management	8
• Explore change management framework for leadership. • Set process of stakeholder engagement.	**Unit VI: Change Management and Social Responsibility** 6.1 Change Management Framework	6

• Define work culture principles-based labor right guidelines • Explore the principles of sustainability.	6.2 Communication and stakeholder engagement 6.3 Corporate social responsibility 6.4 Decent workplace, labor standards in school 6.5 Digital working environment in School	
• Define concept of digital and smart school • Explore the process of planning of digital school • Select appropriate technology for school education and administration. • Explore the Virtual learning environment practices in school education. • Define a digital communication system in school • Explore the e-services such as administration, examination, monitoring system in school education.	**Unit VII: Digital Leadership in School Education** 7.1 Concept of Digital and Smart School 7.2 Planning of Digital School 7.3 Shaping and selecting digital technology 7.4 Development of Virtual Learning Environment in School 7.5 Digital and Virtual Communication in School 7.6 Management of educational e-services in School	**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 specific units.

4.1 General Instructional Techniques

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

4.2 Specific Instructional Techniques

5 Evaluation

6.1 Internal Evaluation 40%

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

1)	Attendance	5
2)	Class participation	5
3)	First assignment (Group work based on Unit II, III, IV)	10

4)	Second assignment (Pair work based on Unit VI and VI)	10
5)	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.

Objective type question (Multiple choice 10 x 1ponts)	10
Short answer questions with two OR option (6 questions x 5 points)	30
Long answer questions with one OR option (2 questions x 10 points)	20
Total	60

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

Recommended books:

References materials:

Lee, M., & Gaffney, M. (Eds.). (2008). *Leading a digital school: Principles and practice*. ACER Press.

Kouzes, J. M., & Posner, B. Z. (2017). *The leadership challenge: How to make extraordinary things happen in organizations* (Sixth edition). Leadership Challenge, A Wiley Brand.

Sinek, S. (2017). *Leaders eat last: Why some teams pull together and others don't* (Paperback edition). Portfollo/Penguin.

Covey, S. R., & Collins, J. C. (2020). *The 7 habits of highly effective people: Powerful lessons in personal change* (Revised and updated. Simon & Schuster edition). Simon & Schuster.

प्राविक परिषद्को कार्यालय
कीर्तिपुर

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

Kotter, J. P. (2012). *Leading change*. Harvard Business Review Press.

Self-paced Course: https://learn.saylor.org/course/resources.php?id=70

Course Title: Operating System
Nature of Course: Theoretical + Practical
Credit Hour: 3 hours (2T + 1P)
Teaching Hour: 64 hours (32 + 32)

Course No.: ICT Ed. 445
Level: Bachelor
Program: BICTE
Semester: Fourth

1. Course Description

This course is focused on how operating system (OS) manages resources to support the functioning of computer system. This course also helps the students to understand both theoretical and practical knowledge about different concepts of operating systems such as system structure of OS, process and thread management, memory management, storage management, and I/O management concepts.

2. General Objectives

Following are the general objectives of this course:

- To familiarize the basic concepts of operating systems.
- To develop both practical and theoretical concepts of process and thread concept, process synchronization and deadlock
- To make the student knowledgeable about memory management strategies, file system management and storage management.
- To be able to make distinction between available operating systems in terms of their design and working principle.

3. Course Outlines:

Specific Objectives	Contents
• To define and basic concepts of operating systems • Identify and state different types of operating systems • To explain different operations of operating systems • To define different structure of operating systems • To introduce system calls	**Unit 1: Introduction (3)** 1.1. What operating system do? 1.2. Operating Systems operations 1.3. Operating System services 1.4. Operating System Structures 1.5. System Calls **Practical Work (3)** – Write program to make use of command line arguments – Create different commands to support user operations
• To define and differentiate process and thread • To define different operations of processes • To illustrate different process states • To explain inter-process communication • To solve critical-selection problem	**Unit 2: Process Management (12)** 2.1. Process and Thread Concepts 2.2. Operations on processes 2.3. Interprocess Communication 2.4. Process states 2.5. Process Synchronization: critical section problems and solutions 2.6. Peterson's Solution

• To demonstrate process synchronization and its details • To develop knowledge of scheduling criteria • To make use of different CPU scheduling algorithms • To illustrate different concept of deadlock • To explain different methods for handling deadlocks	2.7. Mutex Locks 2.8. Semaphores 2.9. Monitors 2.10. CPU Scheduling Concepts 2.11. Scheduling Criteria 2.12. Scheduling Algorithms: First come First Serve (FCFS), Shortest Job First (SJF), Shortest Remaining Time First (SRTF), Round Robin 2.13. Deadlocks: characterization, prevention, avoidance, detection and recovery **Practical Works (9)** – Demonstrate process creation and thread creation – Simulate CPU Scheduling algorithms: FCFS, SJF, SRTF, Round Robin – Simulate deadlock avoidance algorithm: Banker's Algorithm
• To understand different memory management strategies • To explain the concepts of swapping • To illustrate about paging techniques and the detail structure of page table • To know about segmentation • To make distinction between paging and segmentation • To explain importance of virtual memory management • To implement page replacement algorithms	**Unit 3: Memory Management (8)** 3.1. Main Memory Management 3.2. Swapping 3.3. Memory allocation strategies 3.4. Paging and its types 3.5. Structure of the Page Table 3.6. Segmentation 3.7. Virtual memory management 3.8. Page replacement algorithms **Practical Works (7)** – Write program to simulate paging – Write program to simulate Page Replacement algorithms
• To identify disk structure • To make use of disk scheduling algorithms • To explain the basics and importance of RAID • To define file concepts, different file access methods, file-system structure, and file-system implementation • To explain directory and directory implementation • To demonstrate allocation methods and	**Unit 4: Storage Management (9)** 4.1. Disk Structure 4.2. Disk Scheduling algorithms: FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK 4.3. RAID Structure 4.4. File Concept and Access Methods 4.5. Directory Structure 4.6. Directory Implementation 4.7. File System Structure and operations 4.8. Allocation Methods

free space management	4.9. Free Space Management **Practical Works (7)** – Demonstrate Directory and File Attributes – Write program to simulate disk scheduling algorithms: FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK
• Prepare case study summary report to understand different aspect of Linux system and Windows system	**Unit 5: Case Study (Practical Works) (6)** 5.1. The Linux System 5.2. Windows OS 5.3. Android OS

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 particular units.

4.1. General Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of multi-media projector, 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. The details of suggested instructional techniques are presented below:

Units	Activities
Unit 1: Introduction	• Demonstrate the working mechanism of operating systems • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students on at least 5 operating systems
Unit 2: Process Management	• Demonstrate process and thread concepts • To define the CPU scheduling and interprocess communication • To define process synchronization, scheduling, and deadlock • Lab work to demonstrate process creation and thread creation and simulate Processor Scheduling and deadlock detection algorithms
Unit 3: Memory Management	• Demonstrate concepts of memory, swapping, paging, and virtual memory • Lab work on page replacement algorithms
Unit 4: Storage Management	• Demonstrate disk structure, RAID structure • To illustrate file and directory concepts • Lab work to demonstrate directory and file structure, and to

	simulate disk scheduling algorithms and file management techniques
Unit 5: Case Study	• Presentation by students on different concepts of Linux, Android OS and Windows 10 Operating Systems

5. 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:

6) Class Attendance	5 points
7) Learning activities and class performance	5 points
8) First assignment (written assignment)	10 points
9) Second assignment (Case Study/project work with presentation)	10 points
10) Terminal Examination	10 Points
Total	**40 Points**

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 1mark)	10 Points
2) Subjective answer questions (6 questions with 2 OR x 5 marks)	30 Points
Total	**40 points**

5.3. **External Practical Exam/Viva (20 Points):**

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)

Abraham Silberschatz, Pter Baer Galvin and Greg Gagne, Operating System Concepts, (2018). 10th Edition, John Wiley & Sons Inc

Andrew S. Tanenbaum, Herbert Bos, Modern Operating Systems, 4th Edition, Pearson

Course Title: Database Management System
Course No. : ICT. Ed. 446
Level: Bachelor
Semester: Fourth

Program: BICTE
Nature of course: Theoretical + Practical
Credit Hour: 3 hours (2T+1P)
Teaching Hour: 80 hours (32+48)

1. **Course Description**

The purpose of this course is to introduce the fundamental concepts of database management, including aspects of data models, database languages, and database design. Student will be also able to understand the current trends of database management such as big data, data analytics: data warehousing, online analytical processing and data mining.

2. **General Objectives**

Through this course, students shall

- become proficient at modeling databases at conceptual and logical levels of design,
- be able to develop database schemas with design principles that enforce data integrity,
- become knowledgeable in the creation, altering, and manipulation of tables and views using SQL,
- become proficient at casting queries in SQL, and
- be able to understand concepts of transaction management, concurrency control, and recovery.
- Be able to explain about big data and data analytics such as data warehousing, online analytical processing and data mining

3. **Course Outlines:**

Specific Objectives	Contents
• Identify data management approaches and their values. • Define differences between file systems and database management systems. • Understand benefits of database management systems. • Describe different data models and their usefulness. • Understand the concept of data abstraction and data independence.	**Unit 1: Database System Introduction (4 hrs)** 1.1. Database System Applications 1.2. Purpose of Database Systems 1.3. View of Data 1.4. Database and Application Architecture 1.5. Database Users and Administrators **Practical Work (4 hrs)** • Create program to demonstrate differences between data access from file system and database management system
• Explain use and importance of ER model. • Use ER diagrams to design databases. • Learn to identify attributes and entity-relationship sets • Make use of generalization, specialization and aggregation	**Unit 2: Database Design using ER Model (4 hrs)** 2.1. The ER Model : entity sets and relationship sets 2.2. Attributes and its types 2.3. Mapping Cardinalities 2.4. Constrains on ER Model 2.5. Extended ER Features: Aggregation, Specialization and Generalization, Constraints on

concepts • Learn conversion of ER diagrams into Relational model.	Specialization/Generalization 2.6. Reducing ER diagram to Relational Schemas **Practical Works:** **(8 hrs)** • Draw ER diagrams for real world scenarios • Learn to use appropriate symbols for constraints • Practice Conversion of ER model to Relational model
• Explain structure of SQL queries. • Use SELECT, FROM and WHERE clauses efficiently. • Understand concept behind join operations. • Discuss and Use aggregate functions and subqueries. • Apply database modification statements. • Explain and use DDL statements. • Understand concept behind views and use them. • Make use of grant and revoke statements	**Unit 3: Structured Query Language (SQL)** **(6 hrs)** 4. Introduction to Relational Database 5. Database Schema and Schema Diagram 6. Introduction: Basic Structure of SQL Query, SELECT, FROM and WHERE clause, Using Multiple Relations 7. String/Pattern Matching, Ordering the Display of Tuples, Cartesian product, Join Operations: Join Types and Join Conditions. 8. Set Operations and Null Values 9. Nested Queries: Set membership Test, Set Comparison and Test for Empty Relations. 10. Aggregate Functions, Group by Clause and Having Clause 11. Database Modifications: Insert, Delete and Update Operations 12. Data Definition Language: Domain Types in SQL, Create, Alter and Drop statements 13. View 14. Authorization in SQL : grant and revoke privileges **Practical Works:** **(18 hrs)** • Create relational database by using create statements • Populate tables with data by using INSERT statement • Practice basic SQL queries by using Select..from.. where • Use Cartesian products, natural join and set operations to solve queries • Use sub queries, aggregate functions and outer joins to solve queries • Practice DML statements DELETE and UPDATE • Practice DDL statements ALTER, and DROP • Demonstrate SQL authorization: grant and revoke operations
• Understand importance of integrity constraints. • List and discuss different	**Unit 4: Integrity Constraints** **(4 hrs)** 4.1 Domain Constraints: Not Null Constraints, Unique Constraints, Primary key Constraints, Check Constraints.

types of integrity constraints. • Use Integrity constraints for maintaining for achieving correctness of data. • Compare and contrast between assertions and triggers	4.2 Referential Integrity: Using Referential Integrity, Cascading Actions 4.3 Assertions and Triggers: Creating and Deleting Assertions, Creating and Deleting Triggers, Assertions vs Triggers. **Practical Works:** **(4 hrs)** • Demonstrate use of Domain constrains and referential integrity • Create assertions and triggers
• Exemplify database modification anomalies. • Understand and exemplify functional dependencies. • Discuss and exemplify conversion of de-normalized relations into normalized forms.	**Unit 5: Relational Database Design** **(6 hrs)** 5.1 Features of good relational designs 5.2 Keys: Super Key, Candidate Keys and Primary Keys 5.3 Functional Dependencies 5.4 Anomalies 5.5 Decomposition using functional dependencies 5.6 Normal forms: 1NF, 2NF, 3NF and BCNF **Practical Works:** **(8 hrs)** • Demonstrate Database anomalies • Design good RDBMS (anomalies free database)
• Understand the concepts of transaction and its properties • Make use of serializability • Understand the problems behind concurrent execution of transactions • Describe and exemplify lock based concurrency control technique. • Discuss need of recovery in database management systems.	**Unit 6: Transaction Management** **(4 hrs)** 6.1 Transaction Concept 6.2 ACID Properties 6.3 Serializability 6.4 Concurrency Control: Need of Concurrency Control, Lock-Based Protocols 6.5 Recovery: Failure Classification, Shadow paging **Practical Works:** **(2 hrs)** • Demonstrate commit and rollback
• Understand the concept of big data, NoSQL, data warehousing, data mining and OLAP	**Unit 7: Big Data Analytics** **(4 hrs)** 7.1 Concept of Big data 7.2 Concept of NoSQL 7.3 Concept of Data Warehouse and Data Mining 7.4 Concept of Online Analytical Processing **Practical Works:** **(4 hrs)** • Research about different NoSQL Syntax

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 particular units.

4.1 General Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of multi-media projector, 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. The details of suggested instructional techniques are presented below:

Unit 1: Self reading, and making study reports
Unit 2: Assignment on Creating ER diagrams and converting ER model to Relational model
Unit 3: Homework and Assignment on Laboratory works in SQL
Unit 4: Group Discussion on Integrity Constraints
Unit 5: Mini Case Study on Normalization
Unit 6: Self reading and making study reports
Unit 7: Self reading, creating and presenting study reports

5. Evaluation :

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

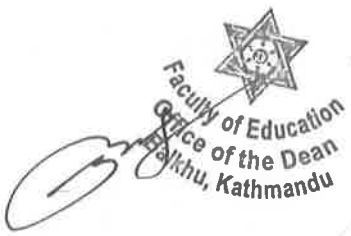
Note: Students must pass separately in internal assessment, external practical exam and semester examination.

6. 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

7. Semester Examination (40 Points)



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

3) Objective question (Multiple choice 10 questions x 1mark) 10 Points
4) Subjective answer questions (6 questions with 2 OR x 5 marks) 30 Points

Total	40 points

8. **External Practical Exam/Viva (20 Points):**
Examination Division, Dean Office will conduct final practical examination at the end of semester.

- **Recommended books and References materials (including relevant published articles in national and international journals)**

Recommended books:

- Silberschatz, H.F. Korth, and S. Sudarshan, *Database System Concepts*, 7th Edition, McGraw Hill, 2019

References materials:

- C.J. Date, *SQL and Relational Theory: How to Write Accurate SQL Code*, 2nd Edition, O'Really Media, 2011
- C.J. Date, *An introduction to Database System*, 8th Edition, Addison Wesely, 2003

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

Course Title: System Analysis and Design
Course No. : ICT Ed. 447
Level: Bachelor
Semester: Fourth

Nature of Course: Theoretical + Practical
Credit Hours: 3 (2T+1P)
Teaching Hours: 64 (32T+32P)

1. Course Description

The course is a blend of understanding of system analysis & design with its practical applications. This course includes understanding of various elements of system analysis and design with emphasis on the application of information technology issues as a business tool. The course covers components of system analysis and design techniques, data modeling, logical process modeling, and object oriented modeling techniques.

2. Course Objectives

Following are the general objective of this course:

- To familiarize the students with System Development Life Cycle.
- To enable student to recognize different system development models
- To enhance the skill of students in System analysis and design of user centered System requirements.
- To make the students competent in analysis, design and implementation.
- To make the students knowledgeable about the latest trends of modern system analysis and design.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Explain system and its major components • Identify system attributes, properties and characteristics • Define System Development Lifecycle • Discuss steps in System Development Lifecycle • Understand the user needs • Differentiate between commercial product and contract system development	**Unit 1: System: attributes, properties and characteristics (3 Hrs)** 1.1. What is a System? 1.2. Learning to Recognize Types of Systems 1.3. Analytical Representation of a System 1.4. System Stakeholders: User and End User Roles 1.5. System Attributes, Properties and Characteristics 1.6. System/Product Life Cycle Concepts 1.7. Understanding the User's Problem, Opportunity, and Solution Spaces 1.8. Commercial/Consumer Product Versus Contract System Development **Practical Works (3 hrs)** • Visit any type of organization and observe their

	business process and prepare a field report that identifies each and every aspect of their business process and present it in your class too.
• Explain and understand different system development models: waterfall, spiral, iterative and incremental, evolutionary, agile development model, • Differentiate between different system development models	**Unit 2: System Development Process Model (5 Hrs)** 2.1. Introduction to the System Development Models 2.2. Waterfall Development Strategy and Model 2.3. Spiral Development Strategy and Model 2.4. Iterative and Incremental Development Model 2.5. Evolutionary Development Strategy and Model 2.6. Agile Development Strategy and Model **Practical Works** **(5 hrs)** • Visit Software Development Company and study or enquire the system development process model used by them and prepare report about it and also present in class.
• Describe importance of system documentation • Know about data accession list (DAL) and data criteria list (DCL) • Create system documentation • Identify different issues in system documentation	**Unit 3: System Documentation Strategy (4 Hrs)** 3.1. Quality System and Engineering Data Records 3.2. System Design and Development Data 3.3. Data Accession List (DAL) and Data Criteria List (DCL) 3.4. Documentation Levels of Formality 3.5. System Documentation Issues **Practical Works** **(4 hrs)** • Study system document written for any type of system (which can be collected from local or global software company), then share your understanding in class.
• Discuss importance of requirements • Know to gather requirements • Design requirement traceability path • Construct requirement statements • Develop appropriate requirement verification methods	**Unit 4: Requirement Derivation, Allocation, Flow Down and Traceability** **(4 Hrs)** 4.1 Introduction 4.2 Requirements Derivation Methods 4.3 Requirements Derivation and Allocation Across Entity Boundaries 4.4 Requirements Allocation 4.5 Requirements Traceability 4.6 Preparing the Requirement Statement 4.7 Selection of Requirement Verification Methods **Practical Works** **(4 hrs)**

	• Prepare requirement document for the system that you are going to develop in this semester. The system might be the one which was identified in practical works of unit 1.
• Discuss user centered system design • Design system incorporating Human Factors and Ergonomics • Decompose complex system into small chunks to better understand • Apply SE, HF and Ergonomics actions	**Unit 5: User Centered System Design (4 Hrs)** 5.1 Introduction to UCSD 5.2 Understanding Human Factors (HF) and Ergonomics 5.3 Situational Assessment: Areas of Concern 5.4 Complex System Development 5.5 SE, HF and Ergonomics Actions **Practical Works** (4 hrs) • Read at least one research article related to user centered system design and write review and share with class.
• Demonstrate different system architecture models • Understand and make use of system architecture to design interface • Design interface embedding control challenges	**Unit 6: System Architecture Development (4 hrs)** 6.1 Introduction to System Architecture Development 6.2 Development of System Architectures 6.3 Interface Definition Methodology 6.4 Interface Design 6.5 Interface Definition and Control Challenges and Solutions **Practical Works** (4 hrs) • Prepare architectural design of the proposed system (proposed in practical works of unit 4).
• Discuss system testing • Design test cases • Prepare test data • Perform test procedures • Understand the test challenges and resolve	**UNIT 7: System Integration, Test, and Evaluation (SITE)** **(4 Hrs)** 7.1 SITE Fundamentals 7.2 Key Elements of SITE 7.3 Planning for SITE 7.4 Establishing the Test Organization 7.5 Developing Test Cases (TCs) and Acceptance Test Procedures (ATPs) 7.6 Performing SITE Tasks 7.7 Common Integration and Test Challenges and Issues **Practical Works** (4 hrs) • Prepare test case and test data for the system designed in practical works of unit 6.

• Discuss system deployment • Perform system maintenance • Understand system reliability, maintainability and availability • Perform system disposal operations	**Unit 8: System Deployment, OM&S, Retirement, and Disposal** (4 Hrs) 8.1 System Deployment Operations 8.2 System Operation, Maintenance, and Sustainment (OM&S) 8.3 System Reliability, Maintainability, and Availability (RMA) 8.4 System Retirement (Phase-Out) Operations 8.5 System Disposal Operations **Practical Works** (4 hrs) Visit any organization and study the system deployment process used by them and prepare report about it and also present in class.

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 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. 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:

16) Class Attendance	5 points
17) Learning activities and class performance	5 points
18) First assignment (written assignment)	10 points
19) Second assignment (Case Study/project work with presentation)	10 points
20) Terminal Examination	10 Points
Total	40 points

5.2 Semester Examination (40 Points)

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

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

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)

Prescribed Texts

1. Charles S. Wasson, *System Engineering Analysis, Design, and Development*, Wiley

References

1. Jefferey A. Hoffer, Joey F. George, Joseph S. Valacich, Modern Systems Analysis and Design, 7th Edition, Pearson Education
2. Jeffrey L. Whitten, Lonnie Bentley, System Analysis and Design methods, 7th Edition, Mc-Graw Hill
3. Joseph S. Valacich, Joey F. George, Jefferey A. Hoffer, Essentials of System Analysis and Design, 5th Edition, Pearson Education.
4. Gary B. Shelly, Harry J. Rosenblatt, System Analysis and Design, 9th Edition, Shelly Cashman Series
5. Alan Dennis, Barbara Haley Wixom, Roberta M. Roth System Analysis and Design, 4th Edition, Wiley Publication
6. V. Rajaraman, Analysis and Design of Information System, 2nd Edition, Prentice Hall

Course Title: Numerical Analysis

Course No.: Math. Ed. 447 | Nature of course: Theoretical

Level: BICTE | Credit Hour: 3 hours

Semester: Fourth | Teaching Hour: 48 hours

---

1. Course Description:

This course is designed for the students of BICTE under Tribhuvan University. It helps students to fulfill their increasing desire towards numerical answers to applied problems with the help of methods and techniques of numerical analysis. Although numerical methods have always been useful, their role in thepresent day scientific research is of fundamental importance. It deals with numerical methods which give the solution when ordinary analytical methods fail for the solution of transcendental equations. In addition, it deals those numerical techniques which can be used for the solution of system of linear equations through matrix computations along with solution of non-linear equations through interpolation and iterative method of differentiation and integration. This course also provides a foundation for the mathematical modeling in the field of research.

2. General Objectives

3. To understand errors and approximation.
4. To use different methods for solving transcendental and linear simultaneousequations.
5. To define different types of differences and construct their tables, and establishthe relationship between them.
6. To be familiar with interpolation and apply suitable interpolation formula fornumerical problems
7. To deal with numerical approximations of derivatives
8. To approximate computation of an integral using numerical technique

3. Specific Objectives and contents

Unit-I Errors and computation of roots (8 hrs)	
• To identify the types of errors • To derive general error formula • To generalize a series approximation • To solve linear equations graphically • To find solution of equations by bisection method • To discuss the method of false position • To solve equations by iteration method • To use Newton –Raphson iteration formula • To apply the Muller 's method to approximate the roots of equations	• Significant digits • Errors • General error formula • Error in a series approximation • Linear equations • Graphical solution of equations • Bisection method • The method of false position • Iteration method • Newton – Raphson method • Generalized Newton's formula for multiple roots • Muller's method
Unit –II Solution of Linear simultaneous Equations (8 hrs)	
• To identify linear-simultaneous equations. • To apply Gauss elimination method in solving simultaneous equations • To solve simultaneous equations by Gauss –Jordan method • To solve LS equations by using Jacobi's and Gauss – Seidel iteration method • To discuss and use factorization, Iterative and partition methods to solve simultaneous equations.	• Linear simultaneous equations (LSE) • Gauss elimination method • Gauss – Jordan method • Jacobi – iteration method • Gauss – Seidel iteration method • Matrix inversion method • Factorization method • Iteration method • Partition method

Unit –III Differences of polynomials	(10 hrs)
• To discuss forward and backward difference operators • To construct difference tables • To discuss properties of the forward difference operator • To establish relationship among the operators E ,D and Δ • To express a given polynomial in factorial notation • To identify the central difference operator and the mean operator • To construct the central difference table • To establish relationship between theoperators Δ ,∇ ,E ,μ and δ	• Forward difference operator • Forward difference table • The operator E • Relation between the operators E and Δ • The operator D • Backward difference table • Factorial polynomial • Central difference operator • Central difference table • Mean operator • Relationship between operators Δ ,∇ ,E ,μ and δ
Unit –IV Interpolation with Equal Intervals	**(8 hrs)**
• To derive and use Newton – Gregory forward interpolation formula • To derive and use Newton –Gregory backward interpolation formula • To apply forward and backward interpolation formulae in solving problems • To derive and use Gauss' forward and backward interpolation formula • To apply Bessel's and Stirling's formula for interpolation	• Newton –Gregory forward interpolation formula • Newton - Gregory backward interpolation formula • Error in the interpolation formula • Gauss' forward interpolation formula • Gauss' s backward interpolation formula • Bessel's formula • Stirling's formula
Unit -v Interpolation with Unequal Intervals	**(4 hrs)**
• To discuss linear and quadratic interpolations • To find divided differences • To establish the relationship between divided differences and ordinary differences	• Linear interpolation • Quadratic interpolation • Divided differences • Second divided difference • Newton 's divided difference interpolation • Relation between divided differences and ordinary differences
Unit – VI Numerical Differentiation and integration (10 hrs)	

• To derive formula for the derivative using forward and backward difference formula • To derive formula for derivative using central difference formula • To derive general quadrature formula • To apply trapezoidal rule , Simpson's one –third rule ,three-eighth rule , Bool's rule and Weddle's rule for solving numerical problems • To find errors in quadrature formula	• Numerical differentiation • Derivative using forward difference formula • Derivative using backward difference formula • Derivative using central difference formula • General quadrature formula for equidistant ordinates • Trapezoidal rule • Simpson,s One –Third rule • Simpson,s Three – Eighth rule • Bool,s rule • Weddle ,s rule • Errors in quadrature formula

4. Instructional Techniques

Units	Activity and Instructional Techniques
Unit I	• Individual and group discussion on calculating errors
Unit II	• Individual and group discussion on bisection and iteration methods • Group and individual assignments on problems of getting roots by bisection method
Unit III	• Group and individual discussion on different methods of solving linear simultaneous equations
Unit IV	• Individual and group assignments on finite differences
Unit V	• Presentation and discussion on computer programming in c++ of important methods
Unit VI	• Individual and group presentation on divided differences and ordinary differences

5. Evaluation

Internal evaluation

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

a. Attendance	5 points
b. Participation in learning activity	5 points
c. First assessment test	10 points
d. Second assessment test	10 points
e. Third assessment test	10 points

.....Total

NOTE: Internal evaluation and assignments may include the numerical calculation and computation by using different computer application like as Matlab, Geobebra and MS Excel also.

External Evaluation:

Faculty of Education, Examination division will conduct final examination of weight 60points at the end of semester. This 60 points is divided in final examination paper as Objective questions (10 x 1) 10 points
Short answer questions (with two OR question) (6 x 5) 30 points
Long answer questions (with one OR question) (2x 10) 20 points
.....
Total 60 points

6. Recommended and Reference Books

6.1 Recommended books

Sastry, S.S. (1990). *Introductory methods of numerical analysis* ,New Delhi :Prentice- Hall of India (Units I – VI)

Gupta S. and Sharma S.(2014).*Numerical analysis* ,New Delhi : S.K .Kataria &Sons (Units I – VI)

6.2 Reference books

Conte S.D. (1965) , *Elementary numerical analysis* Mc Graw- Hill Froberge

C.E. (1965) , *Introduction to numerical analysis* ,Adison Wesley

Jian , M.K.(1971) , *Numerical analysis for scientists and engineers* Delhi:S.B.W .Publishers

Sastry S.S. (1997) , *Engineering mathematics* , New Delhi : Prentice-Hall of India Stanton , R.G. (1967) , *Numerical methods for science and engineering* , New Delhi:Prentice-Hall of India

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

Tribhuvan University
Faculty of Education
Office of the Dean

BACHELOR OF INFORMATION AND COMMUNICATION TECHNOLOGY EDUCATION (BICTE)
Fifth Semester Curriculum

Office of the Dean
Faculty of Education
Tribhuvan University
Kathmandu

Table of Contents

Course Title: Assessment and Evaluation in Education

Course No.: Ed. 452
Level: Bachelor
Semester: Fifth
Program: BICTE

Nature of Course: Theoretical
Credit Hours: 3
Teaching hours: 48

1. Course Description

This course is designed to provide students with an understanding of the basic concepts of test, assessment, measurement and evaluation in education. It also intends to help students understand different types of evaluation and qualities of a test. It further deals with the construction and purposes of teacher made test, measuring instruments, administration and scoring of the test, use of statistics in the interpretation of test results. Moreover, students will be familiar with the current assessment system at the school level of Nepal.

2. General Objectives

The general objectives of the course are as follows:

- To provide the students with a deeper understanding of the concept of test, assessment, measurement and evaluation
- To acquaint the students with types and qualities of the test
- To develop skills among the students in constructing test items with technical qualities
- To enable the students in administering and scoring different types of test items
- To enable the students to analyze the test results
- To familiarize the students with the existing evaluation practices of the schools of Nepal

3. Specific objectives and contents

Specific Objectives	Contents
• Differentiate test, measurement, assessment and evaluation. • Explain various types of evaluation in terms of purpose, tools and uses.	**Unit 1: Assessment and Evaluation (8)** 1.1 Concept of test, measurement, assessment and evaluation 1.2 Types of evaluation: purpose, tools and uses 1.4.1 Diagnostic 1.4.2 Placement 1.4.3 Formative 1.4.4 Summative
• Explain the essential qualities of a test.	**Unit 2: Characteristics of a Test (10)** 2.1. Essential qualities of a test 2.1.1 Reliability 2.1.2 Validity

• Explain the methods of estimating reliability. • Describe various types of validity.	2.1.3 Objectivity 2.1.4 Usability 2.2 Methods of estimating reliability 2.2.1 Test-retest 2.2.2 Parallel form 2.2.3 Split halves 2.2.4 Kuder-Richardson method 2.3 Types of validity 2.3.1 Content 2.3.2 Criterion: concurrent and predictive 2.3.3 Construct
• Explain the teacher made test. • Discuss the purposes of testing. • Explain the meaning, types, construction and uses of subjective and objective type tests. • Identify necessary process for preparing test items. • Discuss the cognitive domain of the taxonomy of educational objectives • Plan the test for classroom testing purpose • Write instructional objectives for testing. • Prepare specification chart. • Construct subjective and objective test items.	**Unit 3: Construction of Teacher Made Test (12)** 3.1 Concept of teacher made test 3.2 Purposes of testing: Instructional, grading, diagnostic, selection, placement, counseling, curricular decisions and policy making 3.3 Types of test items 3.3.1 Subjective test: types, construction and uses 3.3.2 Objective test items: types construction and uses 3.4 Taxonomy of educational objectives: cognitive domain 3.5 Teacher made test: construction process 3.5.1 Planning the test • Writing instructional objectives • Preparing specification chart 3.5.2 Preparing the test • preparing test items • Preparing instructions • Preparing scoring key and marking scheme
• Describe the necessary conditions and administration of test. • Suggest measures for scoring the subjective and objective answer sheets • Apply frequency of distribution, graphical representation, central tendency	**Unit 4: Administration, Scoring and Analysis of Test (8)** 4.1 Conditions and administration of test 4.2 Scoring of subjective and objective answer sheets 4.3 Statistical analysis of test scores 4.3.1 Frequency distribution 4.3.2 Graphical representation: line-graph, bar-graph and pie chart 4.3.3 Central tendency: Mean, Median, Mode 4.3.4 Measure of dispersion: Standard deviation

and standard deviation in interpreting test scores.	
• Explain the current assessment system of school education in Nepal. • Describe the techniques for assessing students with special needs • Explain the meaning, process and practice of continuous assessment system. • Describe the policies, practices, challenges and issues related to student assessment system at the school level of Nepal.	**Unit 5: Current Student Assessment System in Nepal (10)** 5.1 Existing student assessment system at school level 5.2 Assessing students with special needs 5.3 Continuous assessment system (CAS): concept, process and practice 5.4 Challenges and issues of existing student assessment system at school level

Note: Figures within parenthesis indicate approximate teaching hours.

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 specific units.

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.

4.2 Specific Instructional Techniques

Unit	Suggested specific Instructional Techniques
III	• Students will be divided into groups and they will be sent to school with their constructed test items for their administration. • Students will have to score different types of test items administered in the schools • Students will have to calculate frequency distribution, mean, mode and median, and standard deviation.
V	• Students will be assigned individually to visit schools in order to study assessment system. • Students will prepare reports on policy and practices of assessment system in the schools of Nepal and present in the class. • Presentation will be followed by teacher's feedback.

5. Evaluation

5.1 Internal Evaluation 40%

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

1) Attendance	5 Points
2) Class participation	5 Points
3) First assignment (Group work based on school visit- unit III)	10 Points
4) Second assignment (Based on reports on Nepalese education system Unit IV)	10 Points
5) Third assignment (Written test: objectives and subjective)	10 Points
Total	40 Points

5.2. Final/Semester Evaluation 60%

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

Objective type question (Multiple choice 10 x 1ponts)	10
Short answer questions (6 questions with 2 OR x 5 points)	30
Long answer questions (2 questions with 1 OR x 10 points)	20
Total	60

Recommended Books

Aggarwal, J.C. (1997). *Essential of examination system (Evaluation, test and measurement).* New Delhi: Vikas Publishing House.(Pvt.) Ltd. (Unit I-IV)

Ebel, R.C. (1972). *Essentials of educational measurement.* Englewood Cliffs, New Jersey: Prentice-Hall. (Unit I and II)

Gupta, S.P. (1991). Statistical methods. New Delhi: Sultan Chand and Sons Publishers. (Unit IV)

Kubiszyn, T. & Borich, G. (2003). *Educational testing and measurement: Classroom application and practice.* Singapore: John Wiley Sons. (Unit 1 and 2)

Linn, R.L. & Gronlund, N.E. (2008). *Measurement and assessment in teaching (9th Ed.).* India: Pearson Education. (Unit 1-3)

Popham, W.J. (1981). *Modern Educational Measurement.* Englewood Cliffs, New Jersey: Prentice-Hall.(Unit 1 and 2)

Singh, A.K. (2004). *Test, measurement and research method in behavioural science, 3rd Ed.* (Revised reprinted). Bharati Bhaban (P & D). (Unit 1-4)

Thorndike, R.L. and Hegen (1977). *Measurement and evaluation in psychology and education, 4th ed.* New York: John, Willey and Sons. (Unit 1 and 2)

References

Adhikari, B.K. (1959 BS). *Educational measurement and evaluation.* Kathmandu: Pinacal Publication.

Freeman, R. & Lewis, R. (2005). *Planning and implementing assessment.* London and New York: Rutledge Falmer Publication.

JBR, S. P. and et. al. (2061 BS). *Theory and practice of measurement and evaluation in education.* Kathmandu: Viddyarthy Pustak Bhandar.

Khanal, P. (2061). *Education research methodology*. Kathmandu, Kirtipur: Students' Book Publishers and Distributers.

Sidhu, K.S. (2005). New approaches to measurement and evaluation. New Delhi:

ICT.Ed.455 : Java Programming Language

Course No. : ICT.Ed.455
Level: Bachelor.
Semester: Fifth
Program: BICTE

Nature of course: Theoretical + Practical
Credit Hour: 3 hours (2T+1P)
Teaching Hour: 80 hours (32+32)

1. **Introduction:**

This course covers object-oriented dimensions of computer programming. It aims to provide students with knowledge and skills on programming terminologies including features of object oriented, data type, operators, variables, constants, control statements, arrays, classes and objects, inheritance and interfaces, exception handling, multithreading programming, I/O handling, event handling, swing and java database connectivity.

2. **Course Objectives:**

After the completion of this course, the students should be able to:

- explain the Java programming environment
- describe and apply the concepts of programming elements using Java and object-oriented programming concepts
- make use of multithreading programming, exception handling and input/output handling in Java
- apply the event handling, GUI programming using swing, and Java database connectivity

3. **Course Outlines:**

Specific Objectives	Contents	Teaching Hours (T+P)
• Describe the basic concept of Java Programing • Make use of different data types and variable. • Use control structure to control execution of programs	**Unit 1: Java Fundamentals, Data Types, Operators and Control Statements** 1.1. History and Philosophy of Java 1.2. Object Oriented Programming 1.3. Java Development Kit 1.4. A First Simple Java Program 1.5. Packages in Java 1.6. Java's Data Types 1.6.1 Integers 1.6.2 Characters 1.6.3 Floating Point Types 1.6.4 Strings	7+7

	1.6.5 Arrays 1.6.6 The Boolean Types 1.7. Literals 1.7.1. Hex, Octal and Binary 1.7.2. Character Escape Sequences 1.7.3. String Literals 1.8. Variables and Constants 1.9. Operators 1.10. Type Casting 1.11. Control Statements 1.11.1. if statement 1.11.2. switch statement 1.11.3. loop statement 1.11.4. continue statement 1.11.5. break statement **Practical Work** • Installation of Java SE and Editors (Notepad++ or NetBeans or Eclipse) on local machine • Writing, Compiling and Executing the first program • Realize different data types in programs • Make use of variables and constants • Write programs to realize different types of operators • Write expression to deploy type conversion • Apply Decision Making and Loop Control • Apply String manipulation and array manipulation	
• Explain and apply the principles of the object-oriented programming • Create programs with methods, constructors, nested and inner classes	**Unit 2: Introducing Classes, Objects and Methods** 2.1 Class Fundamentals 2.2 Object Creation 2.3 Methods 2.4 Command Line Arguments 2.5 Constructors 2.6 Garbage Collection 2.7 This keyword	**6+6**

• Explain garbage collection and variable length arguments • Analyze and apply static fields and methods, this keyword • Demonstrate skills to write. Program to illustrate class and objects, and implement command line arguments in Java • Able to write program with multiple methods	2.8 Static Fields and Methods 2.9 Nested and Inner Classes 2.10 Variable Length Arguments **Practical Work** • Write program to illustrate Class and objects. • Implement command line arguments in java • Write program with multiple methods • Write program that contains constructors • Write program to make use of static methods and members	
• comprehend inheritance, polymorphism, abstract classes and interfaces • Describe and apply access control, super and final keyword • Demonstrate skills for writing program to illustrate simple hierarchical and multilevel inheritance, and implement polymorphism. • Design abstract class, and create and make use of interface	**Unit 3: Inheritance and Interfaces** 3.1 Inheritance Basics 3.2 Inheritance and Constructors 3.3 super keyword 3.4 Method Overriding 3.5 Polymorphism 3.6 Dynamic Binding 3.7 final Keyword 3.8 Abstract Classes 3.9 Access Specifiers 3.10 Interfaces **Practical Work** • Write program to illustrate simple, hierarchical and multilevel inheritance. • Write program to implement polymorphism. • Design abstract class. • Create and make use of interface.	**4+4**
• Explain how to deploy error handling gracefully in java • Describe process of deploy multithreading • Describe and apply skills for writing program to implement exception handling in program, and	**Unit 4: Exception Handling and Multithreading** 4.1 The Exception Hierarchy 4.2 Exception handling fundamentals 4.3 Throwing, Re-throwing and Catching Exceptions 4.4 try, catch, throw, throws, and finally keywords 4.5 Multithreading fundamentals	**3+3**

apply try, catch, throws and finally • Apply of theoretical knowledge to Write program to create threads and multiple threads	4.6 Thread class and Runnable Interface **Practical Work** • Write program to implement exception handling in program. • Apply try, catch, throws and finally • Write program to create threads and multiple threads	
• Identify different I/O streams in Java • Read and Write File effectively • Access files randomly	**Unit 5: Using I/O** 5.1 Console and File I/O 5.2 Opening and closing files 5.3 Scanner Class 5.4 Byte Streams and Character Streams 5.5 Reading and Writing Byte Streams 5.6 Reading and Writing Character Streams 5.7 Random Access Files **Practical Work** • Write program to apply different input and output classes. • use various methods for file I/O	**4+4**
• Describe philosophy and contents of Swing, layout manager and events handling. • Describe process of swing event handling and generate layout with layout managers • Build GUI with Swing components. • Connect the data and java interface using JDBC	**Unit 6: Introducing Swing and Java Database Connectivity (JDBC)** 6.1 Design philosophy of Swing 6.2 Components and Containers 6.3 Layout Managers 6.4 Swing Event Handling 6.5 Basic Swing Components: JButton, JTextField, JCheckBox, JList 6.6 Use Anonymous Inner Classes to Handle Events 6.7 The Design of JDBC 6.8 Executing SQL Statements 6.9 Query Execution **Practical Work** • Write program to apply event handling classes	**8+8**

	• Design layout using swing • Write java program that establish connection with database and execute CRUD operations using JDBC	

4 Instructional Techni

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 Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of multi-media projector, 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. The details of suggested instructional techniques are presented below:

Laboratory Work: The laboratory work includes writing programs to understand all the programming concepts of Java including data types, operators, control statements, objects and classes, inheritance, interface, multithreading, exception handling, input/output handling, event handling, swing and JDBC.

5 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.

a. Internal Evaluation (40 Points):

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

6) Class Attendance	5 points
7) Learning activities and class performance	5 points
8) First assignment (written assignment)	10 points
9) Second assignment (Case Study/project work with presentation)	10 points
10) Terminal Examination	10 Points
Total	40 points

b. 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 1mark)	10 Points
2) Subjective answer questions (6 questions with 2 OR x 5 marks)	30 Points
Total points	40

c. **External Practical Exam/Viva (20 Points):**
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)

Prescribed Text Book:

Java: A Beginner's Guide (2022), 9th Ed., Herbert Schildt, MC Graw Hill

Recommended books:

Core java Volume I – Fundamentals, Ninth Edition, Cary S. Horstmann and Gary Cornell

Core java Volume II – Advanced Features, Ninth Edition, Cary S. Horstmann and Gary Cornell

Java: The Complete Reference, Ninth Edition, Herbert Schildt

Effective Java, Third Edition, Joshua Bloch

Head First Java, 2nd Edition, Kathy Sierra and Bert Bates

Course Title: Data Communication and Networks

Course No.: ICT. Ed. 456
Level: Bachelor.
Semester: Fifth
Program: BICTE

Nature of course: Theoretical + Practical
Credit Hour: 3 hours (2T+1P)
Teaching Hour: 64hours (32+32)

1. Course Description

This course introduces the fundamental concepts on data communication, data transmission mechanisms, Network Architectures, Internet protocols, Local area networks and the practical aspects of networking. It also aims to develop networking skill such as sub-netting and network infrastructure design and development among students.

2. General Objectives

After successful completion of this course students will be able to

- Identify the different components and their respective roles in computer network and internet
- Explain different services provided by the Network Layers
- Design an enterprise network employing the WLAN, LAN and VLAN technologies and be able to evaluate the advantages and disadvantages
- Configure a PC to work as a host in a TCP/IP network and to use the IP based commands

3. Course Outlines:

Specific Objectives	Contents	Lecture Hrs
• Describe the basic concept of computer network and Internet • Explain layered architecture • Apply computer network skills for installation of Wireshark • Describe process and components of computer networking and install Wireshark for the networking	**Unit 1: Computer Networks and the Internet** 1.1. The Internet 1.2. The Network Edge : Access Networks, Physical Media 1.3. The Network Core : Packet Switching, Circuit Switching 1.4. Delay,Loss, and Throughput in Packet-Switched Networks 1.5. Protocol Layers and Their Service Models : Layered Architecture, Encapsulation 1.6. History of Computer Networking and the Internet **Practical Work** • Installation of Wireshark (free packet sniffer app) and able to use it	3+3

• Describe different services provided by application layer • Identify different application layer protocols • Discuss and apply DNS, peer to peer file distribution and video streaming and content distribution networks • Apply of knowledge and skills for Netflix, youTube, and Wireshark Lab.	**Unit 2: Application Layer** 2.1. The Web and HTTP: overview of HTTP, HTTP Message Format, User-Server Interaction: Cookies, Web Caching 2.2. Electronic Mail in the Internet : SMTP, Mail Message Formats, Mail Access Protocols 2.3. DNS—The Internet's Directory Service 2.4. Peer-to-Peer File Distribution 2.5. Video Streaming and Content Distribution Networks **Case Studies:** • Netflix and YouTube **Practical Works:** • Wireshark Lab: HTTP and DNS	**5+5**
• Describe the basics of transport layer • Compare and contrast different aspect of TCP and UDP • Discuss connection less and connection-oriented transport • Apply knowledge and skills of transport layer for Wireshark Lab	**Unit 3: Transport Layer** 3.1. Introduction and Transport-Layer Services 3.1.1. Relationship Between Transport and Network Layers 3.1.2. Overview of the Transport Layer in the Internet 3.2. Multiplexing and De-multiplexing 3.3. Connectionless Transport: UDP 3.3.1. UDP Segment Structure 3.3.2. UDP Checksum 3.4. Principles of Reliable Data Transfer 3.4.1. Go-Back-N (GBN) 3.4.2. Selective Repeat (SR) 3.5. Connection-Oriented Transport: TCP 3.5.1. Round-Trip Time Estimation and Timeout 3.5.2. Reliable Data Transfer 3.5.3. Flow Control 3.6. TCP Congestion Control **Practical Works:** • Wireshark Lab: Exploring TCP and UDP	**6+6**

• Describe the network layer data plane and control plane differently • Explain the router and different routing algorithms • Make distinction between IPv4 and IPv6 • Apply knowledge and skills of the network layer such Data Plane, Control Plan for Wireshark Lab as well as practicing sub-netting to create small networks	**Unit 4: The Network Layer** 4.1. Data Plane 4.1.1. Inside the Router 4.1.1.1 Input Port Processing and Destination Based Forwarding 4.1.1.2 Switching 4.1.1.3 Output Port Processing 4.1.1.4 Queuing 4.1.1.5 Packet Scheduling 4.1.2. The Internet Protocol (IP) 4.1.2.1 IPv4 Datagram Format 4.1.2.2 IPv4 Addressing 4.1.2.3 Subnetting 4.1.2.4 Network Address Translation (NAT) 4.1.2.5 IPv6 4.2. Control Plane 4.2.1. Routing Algorithms 4.2.1.1 The Link-State (LS) Routing Algorithm 4.2.1.2 The Distance-Vector (DV) Routing Algorithm 4.2.2. Intra-AS Routing in the Internet: OSPF 4.2.3. Routing Among the ISPs: BGP 4.2.4. ICMP: The Internet Control Message Protocol **Practical Works:** • Wireshark Lab: IP • Practice Sub-netting to create small networks	**8+8**
• Explain Link Layer protocols and services provided by link layer • Get insight and analyze error detection and error correction techniques • Explain DHCP, Ethernet technology and VLANs	**Unit 5: The Link Layer and LAN** 5.1. Introduction to the Link Layer 5.1.1 The Services Provided by the Link Layer 5.2. Error-Detection and -Correction Techniques 5.2.1 Parity checks 5.2.2 Check Sum Methods 5.2.3 Cyclic Redundancy Check (CRC) 5.3. Multiple Access Links and Protocols 5.3.1 Channel Partitioning Protocols	**6+6**

• Apply knowledge and skills of the link layer and LAN including multiple access links and protocols switched local area networks, DNS, ARP and Web Client-Server Interaction for Wireshark Labs: 802.11 Ethernet	5.3.2 Random Access Protocols 5.3.3 Taking-Turns Protocols 5.3.4 DOCSIS: The Link-Layer Protocol for Cable Internet Access 5.4. Switched Local Area Networks 5.4.1 Link-Layer Addressing and ARP 5.4.2 Ethernet 5.4.3 Link-Layer Switches 5.4.4 Virtual Local Area Networks (VLANs) 5.5. A Day in the Life of a Web Page Request 5.5.1 DHCP, UDP, IP, and Ethernet 5.5.2 DNS and ARP 5.5.3 Intra-Domain Routing to the DNS Server 5.5.4 Web Client-Server Interaction: TCP and HTTP **Practical Works:** • Wireshark Labs: 802.11 Ethernet	
• Describe and apply Wireless technologies: WiFi and cellular networks • Apply knowledge and skills related to wireless and mobile networks for Wireshark Lab: Wif-Fi	**Unit 6: Wireless and Mobile Networks** 6.1. WiFi: 802.11 Wireless LANs 6.1.1 The 802.11 Wireless LAN Architecture 6.1.2 The 802.11 MAC Protocol 6.1.3 The IEEE 802.11 Frame 6.1.4 Mobility in the Same IP Subnet 6.1.5 Personal Area Networks: Bluetooth 6.2. Cellular Networks: 4G and 5G **Practical Works:** • Wireshark Lab: Wi-Fi	**4+4**

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 particular units.

4.1 General Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of multi-media projector, 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. The details of suggested instructional techniques are presented below:

Unit 1: Assign students to prepare presentation on Internet
Unit 2: Self-study and ask students to prepare case study report on YouTube and Netflix
Unit 3: Homework and Assignment on TCP and UDP
Unit 4: Homework and Assignment on subnetting
Unit 5: Homework and Assignment on Error Detection and Correction Methods
Unit 6: Self-study and ask students to make detail report and presentation on Wireless Technologies: CDMA, 4G, 5G, WiFi: 802.11 Wireless LANs

5 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.*

a. 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

b. Semester Examination (40 Points)

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

3) Objective question (Multiple choice 10 questions x 1mark)	10 Points
4) Subjective answer questions (6 questions with 2 OR x 5 marks)	30 Points
Total points	40

c. External Practical Exam/Viva (20 Points):

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

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

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

Prescribed Text Book:

James F. Kurose & Keith W. Ross, Computer Networking: A Top-Down Approach, 8th Ed., Pearson Education

Recommended Books and Reference Materials:

Tanenbaum Andrew S., Computer Networks, 4th edition (2nd Impression 2006) or available latest edition

William Stallings, Data and Computer Communications, 7th Edition (3rd Impression 2007) or available latest edition

Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, 4th Edition

Halsall Fred, Data Communications, Computer Networks and OSI, 4th edition (10th Indian reprinting 2005)

Course Title: Software Engineering and Project Management

Course No. : ICT Ed. 457
Level: Bachelor
Semester: Fifth
Program: BICTE

Nature of course: Theory + Project
Credit Hour: 3 hours (2T+1P)
Teaching Hour: 64 hours (32+32)

4. Course Description

This course is designed to introduce the fundamental concepts of Software and professional development techniques to the students. It aims to provide in depth knowledge regarding process models, agile development, requirement engineering, software design, software validation, software evolution and maintenance including software management terminologies.

5. General Objectives

Through this course, students shall be able to :

- Evaluate and relate different software processes, system models and architectural designs and assess their suitability in a given context
- Describe and apply basic concepts and principles of requirements engineering, software implementation, testing and maintenance
- Describe the software configuration process and quality assurance
- Apply the software project manage practices and principle in software development.

6. Course Outlines:

Specific Objectives	Contents	Lecture Hours
• Describe the concept of professional development and software engineering ethics • Analyze different types of system through case studies • Identify business problem and prepare software project proposal to solve the problem	**Unit 1: Introduction to Software Engineering** 1.7. Professional Software Development 1.8. Software Engineering Ethics **Case Studies** • Prepare summary report of the following case studies and present it in the classroom: -An Embedded System -An Information System -A Sensor Based Data Collection System -A Support Environment **Practical Works** • Visit any local organization to identify problem of their business process	3 + 6

	• Discuss with your class teacher and prepare software project proposal to address the problem identified	
• Describe the types of software development process • Make comparison of different software process model • Analyse changing business environment with software change management • Explain agile development models and agile project management	**Unit 2: Software Processes and Agile Software Development** 2.6. Software Process Models 2.7. Process Activities 2.8. Coping with Change 2.9. Agile Methods 2.10. Agile Development Techniques 2.11. Agile Project Management 2.12. Scaling Agile Method	**6**
• Identify types of requirements • Explain requirement engineering process • Apply knowledge and skills of requirements engineering for the software project	**Unit 3: Requirements Engineering** 3.1. Functional and Non-Functional Requirements 3.2. Requirements Engineering Processes 3.3. Requirements Elicitation 3.4. Requirements Specification 3.5. Requirements Validation **Practical Works** • Gather functional requirements for the software project and prepare requirement document	**4 + 4**
• Describe need and importance of software architectural design and system modeling • Discuss and apply about different design models in architectural and system modeling • Make distinction between different architectural patterns and application architectures	**Unit 4: Architectural Design And System Modeling** 4.1. Context Models 4.2. Interaction Models 4.3. Structural Models 4.4. Behavioural Models 4.5. Architectural Design Decisions 4.6. Application Architectures **Practical Works** • Prepare design document for the software project	**6 + 4**

• Able to prepare design document for the software project.		
• Describe the need of software validation • Discuss different stages in testing and its process • Explain the concept of software evolution process • Make list of software maintenance issues • Analyze the concepts of legacy system • Able to prepare test case document for the software project	**Unit 5: Software Testing and Software Evolution** 5.1. Development Testing 5.2. Test-Driven Development 5.3. Release Testing 5.4. User Testing 5.5. Evolution Processes 5.6. Legacy Systems 5.7. Software Maintenance **Practical Works** • Prepare test case document for the software project	**5 + 4**
• Explain software project management and planning • Discuss about project estimation techniques • Illustrate the COCOMO model • Discuss about risk management • Explain about software management: quality, software standards, version management, change management and version management	**Unit 6: Software Management** 6.1. Project Management 6.1.1 Risk Management 6.1.2 Managing People 6.1.3 Teamwork 6.2. Project Planning 6.2.1 Software Pricing 6.2.2 Project Scheduling 6.2.3 Agile Planning 6.2.4 Estimation Techniques 6.3. Software Quality and Standards 6.4. Version Management 6.5. Change Management 6.6. Release Management	**8**
• Transform theoretical knowledge to solve real world problems	**Unit 7: Software Engineering Project (Practical Works)** 7.1 Design and develop software project in any of the high level language for partial fulfillment of the course Software Engineering.	**14**

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 particular units.

4.1 General Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of multi-media projector, 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. The details of suggested instructional techniques are presented below:

Unit 1: Self reading, and making study reports
Unit 2: Comparison about different software process model and Assign group discussion task about agile development models
Unit 3: Homework and Assignment on Requirement engineering process
Unit 4: Homework and Assignment to design different system models
Unit 5: Group Discussion on Software testing strategies, Software Evolution and legacy systems
Unit 6: Self reading, creating and presenting on different topics related to software management
Unit 7: Assign to develop a software that can solve real world problem

5 Evaluation

Internal Assessment	External Project Demo 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.*

a. Internal Evaluation (40 Points):

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

16) Class Attendance	5 points
17) Learning activities and class performance	5 points
18) First assignment (written assignment)	10 points
19) Second assignment (Case Study/project work with presentation)	10 points
20) Terminal Examination	10 Points
Total	40 points

b. Semester Examination (40 Points)

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

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

Total points	40

c. **External Project Demonstration Exam/Viva (20 Points):**

External Examination will be evaluated on the basis of following:

1. Project Report: 10 points
2. Project Demonstration: 5 points
3. VIVA: 5 points

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

Prescribed Text Book:

Ian Sommerville. (2015). *Software Engineering* (10th Ed.). Pearson Education

Ian Sommerville (2020). *Engineering Software Products: An Introduction to Modern Software Engineering*, Pearson Education

References materials:

Pressman, R. S. (2010). *Software Engineering: A practitioner's Approach*, 7th Ed. Boston, Mass: McGraw Hill.

John Ousterhout (2021). *A Philosophy of Software Design*, 2nd Ed.

Course Title: Discrete Mathematics

Course No.: Math. Ed. 456
Level: BICTE
Semester: Fifth
Program: BICTE

Nature of course: Theoretical
Credit Hour: 3
Teaching Hour: 48 hours

1. Course Description:

This course is designed for the students of BICTE under Faculty of Education, Tribhuvan University. The course, Discrete Mathematics, is a 3- credit unit course for students studying towards acquiring the Bachelor of Information and communication technology in Education. In this course we will study about discrete objects and the relationship between them and introduce the applications of discrete mathematics in the field of Computer Science. This course provides an introduction to foundational topics in discrete mathematics and the theory of computation. It covers essential concepts such as combinatory, induction and recurrence relations, Boolean algebra, cryptography, functions and sorting algorithms, and finite state automata. Students will develop problem-solving skills and gain a solid understanding of the theoretical foundations of computer science.

2. General Objectives

The general objectives of this course are as follows:

1. To understand the fundamental principles and techniques of combinatory and their applications.
2. To analyze mathematical statement and proofs using induction and recurrence relations.
3. To apply Boolean algebra to analyze and design digital circuits and logical expressions.
4. To explore the principles of cryptography and understand various cryptographic algorithms and protocols.
5. To describe and apply the concepts of functions and sorting algorithms and analyze their efficiency and performance.
6. To understand finite state automata and their applications in formal languages and computational models.

1. Specific Objectives and Contents

Unit 1	I: Combinatory (6 hr)
• to describe and apply counting principles to solve problems. • to solve problems by using the pigeonhole principle • To apply Ramsey's theorem to solve problems. • to calculate and use of the binomial coefficients to solve problems. • to apply the principle of inclusion and exclusion to solve problems.	1.1 Counting principles 1.2 The Pigeonhole Principle and uses 1.3 Ramsey's Theorem 1.4 Outing Strategies 1.5 The binomial coefficients 1.6 principle of inclusion and exclusion
Unit 2	**II: Induction and Recurrence Relations (10 hr)**
• To apply inductive and deductive reasoning to prove mathematical statements. • To use mathematical induction and strong induction to prove mathematical statements. • To solve linear recurrence relations with constant coefficients. • To describe Predicates and Quantification. • To find a particular solution to a linear recurrence relation with constant coefficients. • To apply particular solutions to solve problems. • To apply total solutions to solve problems. • To use generating functions to solve problems involving recurrence relations.	2.1 Inductive and deductive reasoning Mathematical induction 2.2 Applications of mathematical induction 2.3 Strong induction 2.4 Predicates and Quantification 2.5 Recurrence Relations 2.6 Linear recurrence Relations with constant Coefficients 2.7 Particular solution 2.8 Total solution 2.9 Generating function
Unit 3	**III: Boolean Algebra (6 hr)**
• To understand the basic concepts of Boolean algebra, with operators. • To construct and simplify Boolean expressions. • To describe and use of Boolean fuctions. • To use Karnaugh maps to simplify Boolean expressions.	3.1 Boolean Algebra 3.2 Boolean Expression POS and SOP expressions 3.3 Boolean functions Representation, minimization, duality, and complement 3.5 Karnaugh Maps

Unit 4	IV: Cryptography (10 hr)
• To review modular arithmetic, such as the modulus, the Euclidean algorithm, and Fermat's little theorem. • To describe classical cryptography, such as substitution ciphers, transposition ciphers, and the one-time pad. • To apply the basic principles of modern cryptography, public-key cryptography, symmetric cryptography, and hash functions. • To use the basic principles of private-key cryptography, RSA algorithm, modulus,	4.1. Modular arithmetic and properties 4.2. Classical cryptography 4.3. Modern cryptography 4.4. Private- key cryptography 4.5. Public- key cryptography 4.6. The RSA system
Unit 5	**V: Functions and Sorting Algorithm (6 hr)**
• To define relations and functions using graphs and tables. • To find the composite of two functions and inverse of a function. • To understand the special properties of some common functions, such as hashing, greatest integer function, celling function, and floor function. • To use different notations to represent algorithms, such as pseudo code and flowcharts. • To understand and use of the different sorting algorithms.	5.1 Relations (equivalence relation and ordering (partial and linear) relation) and functions 5.2 Composite and inverse function 5.3 Special types of functions(Hashing, Greatest integer function, celling function, floor function) **5.4** Sorting algorithm(Quick, insertion, Radix, Heap, Bubble, Merge, counting)
Unit 6	**VI: Finite State Automata. (10hr)**
• Review the basic concepts of graphs, such as vertices, edges, and paths, adjacency matrix, etc. • To understand the basic concepts of alphabets, languages, and grammars. • To construct and classify different types of grammars.	6.1. Review of graphs (concept only) 6.2. Alphabet, Languages and Grammars 6.2.1 Introduction 6.2.2 Phrase- structure grammar and types 6.2.3 Deviation tree 6.3. Finite-State Machines with Output 6.4. Finite-State Machines with No Output 6.5. Sequence Recognizer Machine

• To construct derivation trees for different types of grammars. • To construct and analyze finite-state machines with output. • To construct and analyze finite-state machines with no output. • To design and implement language recognizers. • To prove that Turing machines are computationally universal.	6.6. Language Recognition 6.7. Turing Machines

2. Instructional Techniques

Units	Activity and Instructional Techniques
Unit I	• Individual and group discussion on calculating errors • Individual and group discussion on bisection and iteration methods
Unit II	• Group and individual discussion on different methods of solving linear simultaneous equations
Unit III	• Group and individual discussion on Differences of polynomials and operators
Unit IV	• Individual and group assignments on Interpolations
Unit V	• Presentation and discussion with problem solving method on interpolations with unequal intervals.
Unit VI	• Individual and group presentation on Numerical Differentiation and integration
Unit I - V	• *The classroom instructions may include the numerical calculation and computation by using programming language C++ or JAVA or different computer applications like: Matlab, Geogebra and MS Excel.*

3. Evaluation

A. Internal evaluation

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

a. Attendance 5 points
b. Participation in learning activity 5 points
c. First assignment / test 10 points
d. Second assignment / test 10 points
e. Third assignment / test 10 points

Total	40 points

NOTE: Internal evaluation and assignments may include the numerical calculation and computation by using different computer application like as Matlab, Geobebra and MS Excel also.

B. External Evaluation:

Faculty of Education, Examination division will conduct final examination of weight 60 points at the end of semester. This 60 points is divided in final examination paper as

Objective questions	(10 Questions x 1 Marks)	10 points
Short answer questions	(6 Questions with 2 OR x 5 Marks)	30 points
Long answer questions	(2 Questions with 1 OR x 10 Marks)	20 points
Total		60 points

4. Recommended books

Kenneth, H. Rosen (2012). *Discrete mathematics and its applications*, Seventh Edition McGraw Hill Publication.

B. Kolman, R. Busby, Sharon C. Ross (2015). *Discrete Mathematical Structures*, Sixth Edition Pearson Publications,

Joe L Mott, Abraham Kandel, Theodore P Baker (2008), *Discrete Mathematics for Computer Scientists and Mathematicians*, Printice Hall of India, Second Edition,

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

प्राविधिक परिषद्को कार्यालय
कीर्तिपुर

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

Table of Contents

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 furtherfamiliarises students with the meaning of action research and the process of carrying out action research in educational setting. Thecourse preparesthe 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
• 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 Drawingconclusions

• Provide the meaning and characteristics of quantitative research. • Explain the quantitative sampling methods and use them in educational research. • Developthe data collection tools for quantitative research. • Analyse the quantitative data using simple statistics. • Distinguish among experimental, survey and correlational research.	**Unit II Quantitative Research (12)** 3.1 Meaning and characteristics of quantitative research 3.2 Random sampling: Simple and stratified 3.3 Data collection tools: Questionnaire, test, scales and check list 3.4 Statistical analysis: frequency, percentage, mean and standard deviation 3.5 Types of quantitative research 3.5.1 Experimental research 3.5.2 Survey research 3.5.3 Correlational Research
• Providethe 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.	**Unit III. Qualitative Research (12)** 3.1 Meaning and characteristics of qualitative research 3.2 Purposive sampling 3.3 Data collection strategies: semi-structured and unstructured interview, participant observation, focus group discussion 3.4 Coding and thematic analysis 3.5 Types of qualitative research 3.5.1 Ethnography 3.5.2 Narrative study
• 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.	**Unit IV Action Research (6)** 4.1 Meaning and characteristics of action research 4.2 Action research cycle 4.2.1 Planning 4.2.2 Acting 4.2.3 Observing 4.2.4 Reflecting 4.3 Preparing action research report
• 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.	**Unit V Writing research proposal and research report (10)** 5.1 Purpose of writing research proposal 5.2 Components of research proposal 5.2.1 Introduction: background, research problem, objectives, delimitation 5.2.2 Literature review 5.2.3 Methodology: design, sampling, data collection tools and data analysis 5.3 Components of research report

	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

4. Instructional Techniques

4.1 General Instructional Techniques

- Introductory presentation on each topic of the unit bye 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	• Students will individually prepare at least 5 research problems and share them in the class. The teacher will provide feedback on their works.
II	• 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	• 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	• Students will be divided into groups and each group willselect an educational problem for action research. They willprepare 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	• 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.

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)
• 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
• 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

• 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
• 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
• 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
• 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.

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**

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

ICT.Ed.466 Computer Graphics

Course Title: **Computer Graphics**
Course No.: ICT Ed 466
Level: Bachelor
Semester: Six

Programme: BICTE
Nature of Course: Theoretical + Practical
Credit Hours: 3 (2T+1P)
Teaching Hours: 64 (32T+32P)

1. **Course Description**

   This course deals with computer graphics consisting of history and application of computer graphics, output primitives, geometrical transformations 2D and 3D, color models, clipping, introduction to three-dimensional graphics, projection and its types, visible surface detection algorithms, illumination model, polygon rendering methods and understanding of computer simulation, animation and virtual reality.

2. **General Objectives**
   - To familiarize the students with computer graphics and its applications
   - To understand the Input hardware and Output Hardware with architecture
   - To make the students competent in implementing algorithm of graphical primitives: point, line and circle.
   - To enable the students to implement two and three – dimensional transformations
   - To apply the students to demonstrating rendering and illumination techniques
   - To know about different color models
   - To understand computer animation and virtual reality.

3. **Specific Objectives and Contents**

Specific Objectives	Contents
• to summarize key milestones in the history of computer graphics. • to illustrate real-world applications of computer graphics in diverse field • to compare and contrast of raster and random scan displays architecture • to identify the different graphical input devices and output devices • to explain the working principles of CRTs and flat-panel displays.	**Unit I: Computer Graphics and Hardware 4T+3P** • History and Applications of Computer Graphics • Input Devices: Mouse, Keyboard, Touch Panel, Light Pen, Digitizer, Data Glove, Bar Code, OCR, OMR, MICR • Hardcopy Output Devices: Printer, Plotter • Display Devices: CRT (monochrome and color), LED, LCD Plasma • Architecture of Raster Scan and Random Scan System **Practical Work** Prepare Case Study Report on one or more topics mentioned below: • Touch Panel • CRT • LED and LCD • Bar Code • History and Application of Computer Graphics
• to define the concept of pixel	**Unit II: Output Primitives 6T+9P**

• 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	2.1 Pixel and Straight Line 2.2 Line Drawing Algorithms: Digital Differential Analyzer (DDA), Bresenham's Line Drawing 2.3 Midpoint Circle Algorithm **Practical Works** • 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.
• 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	**Unit III: 2D and 3D Transformation** **6T+6P** 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 **Practical Works** • Write program to illustrate all types of 2D and 3D transformations
• to understand clipping and its need • to apply point clipping • to utilize Cohen-Sutherland line clipping algorithm • to illustrate Sutherland-Hodgeman polygon clipping algorithm	**Unit IV: Clipping 4T+6P=10** 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 **Practical Works** Write program to implement • Point Clipping • Cohen-Sutherland line clipping algorithm • Sutherland Hodgeman Polygon Clipping algorithm
• to define 3D object • to derive the parallel and perspective projection matrices	**Unit V: Three Dimensional Graphics** **9T+5P** 5.1 3D Object Representation : Polygon Table 5.2 Projection: Definition and Types, Derivation of Parallel and Perspective Projection Matrices

• 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	5.3 Visible Surface Detection Methods: Object Space (Depth Sorting) and Image Space (Z-Buffer, A-Buffer and Scanline) Methods 5.4 Basic Illumination model: Ambient Light, Specular Highlights and Diffuse Reflection 5.5 Polygon Rendering Methods: Constant, Gouraud and Phong Shading 5.6 RGB, HSV and CMYK Color models **Practical Works** • Write program to create 3D object. • Write program to illustrate parallel projection • Write program to illustrate perspective projection
• to understand the simulation, animation and virtual reality concept • to make use of animation tool	**Unit VI: Computer Simulation, Animation and Virtual Reality 3T+3P** 6.1 Introduction to Computer Animation 6.3 Introduction to Simulation 6.4 Introduction of Virtual Reality **Practical Works** • 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

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

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.

ICT.Ed.468 Network Security

Course 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)
• 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
• 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

	2.2.1 The Bell-LaPudala Model **2.3 Integrity Policies** 2.3.1 The Biba Model **2.4 Availability Policies** 2.4.1 Goals of Availability Policies 2.4.2 Denial of Service Models 2.4.3 Example: Availability and Network Flooding **Practical Works** • Visit an organization in your local place and develop security policies and procedures for that organization. Present the prepared report in front of your classmates and the stakeholders of that organization.	
• Explain the Public-Key Encryption Structure. • Apply the Symmetric Cryptosystem. • Explain the requirements for digital signature. • Explain the key management strategies. • Develop cipher text • Identify and implement different types of authentication methods	**3. Cryptography** **3.1 Basic Cryptography** 3.1.1 Symmetric Cryptosystems 3.1.2 Public Key Cryptography 3.1.3 Cryptographic Checksums 3.1.4 Digital Signature 3.1.5 Hashing **3.2 Key Management** 3.2.1 Session and Interchange Keys 3.2.2 Key Exchange and Generation 3.2.3 Cryptographic Key Infrastructures 3.2.4 Storing and Revoking Keys **3.3 Cipher Techniques** 3.3.1 Stream and Block Ciphers 3.3.2 Authenticated Encryption **3.4 Authentication** 3.4.1 Authentication Basics 3.4.2 Passwords 3.4.3 Password Selection 3.4.4 Attacking Passwords 3.4.5 Password Aging 3.4.6 Biometrics 3.4.7 Multifactor Authentication **Practical Works** • Write program to create cipher text • Write program to validate strong password	7+5
• Analyze the network infrastructure.	**4. Security and Protection** **4.1 Network Security** 4.1.1 Network Infrastructure Analysis	8+10

• 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.	4.1.2 Encryption and Decryption in Network 4.1.3 Firewall and its types 4.1.4 Wired and Wireless Security 4.1.5 Virtual Private Network **4.2 System Security** **4.3 Email, Web and Database Security** **4.4 User Security** 4.4.1 Access 4.4.2 Files and Devices 4.4.3 Electronic Communications **4.5 Program Security** 4.5.1 Common Security-Related Programming Problems **Practical Works** • 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.	
• 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.	**5. Threats, Assessment and Solutions** **5.1 Malware** 5.1.1 Introduction 5.1.2 Trojan Horses 5.1.3 Computer Viruses 5.1.4 Computer Worms 5.1.5 Bots and Botnets 5.1.6 Other Malware 5.1.7 Theory of Computer Viruses 5.1.8 Defenses **5.2 Vulnerability Analysis** 5.2.1 Penetration Studies 5.2.2 Vulnerability Classification **5.3 Auditing** 5.3.1 Definition 5.3.2 Designing an Auditing System 5.3.3 Examples: Auditing File Systems **5.4 Intrusion Detection** 5.4.1 Principles 5.4.2 Basic Intrusion Detection 5.4.3 Organization of Intrusion Detection Systems	9+12

	5.5 Attacks and Responses 5.5.1 Attacks 5.5.2 Representing Attacks 5.5.3 Intrusion Response 5.5.4 Digital Forensics **Practical Works** • 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.	

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.*

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

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 assessment 100%
   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
• 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.	**UNIT I: Concept of e-Learning (6T+2P)** 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 **Practical Activities** • Surfing the five key e-Learning portals and explore the key features • Demonstrate the any one VLE online environment and explores the key features

• 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.	**UNIT II: e-Learning 3.0 Tools and Integration (6T+8P)** 2.1 Concept of Pedagogy Wheels and e-learning tools 2.2 Use of Social Media Features for learning such as Facebook, YouTube and LinkedIn etc. 2.3 Integration of Podcasting tools for learning such as audacity etc. 2.4 Integration of AI Generative tools for learning such as Open AI ChatGPT, Google Gemini, Bing Copilot 2.5 AI based translator, rephrase, summarizer and plagiarism detector tools for education such as google translator, quillbot etc. 2.6 Integration of online quiz maker tools for learning **Practical Activities** • 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
• 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.	**UNIT III: Gamification on Learning (6T+10P)** 3.1 Concept of Gamification in Education 3.2 Concept of story telling 3.3 Application of MIT Scratch for gaming 3.4 Different categories of Scratch blocks: Motion, Looks, Sound, Events, Control, Sensing, and Operators. 3.5 Application of MIT Apps Inventor for gaming 3.6 Basic Components of Apps Inventor: user interface, layout, media, sensor. 3.7 Importance of gamification in learning **Practical Activities** • 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
• Define the concept of Learning Management Systems (LMS) and their role in education.	**UNIT IV: LMS and Learning Resources Design (8T+6P)**

• 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.	4.1 Concept of Learning Management System (LMS) 4.2 Open source based LMS tools 4.3 LMS course and learner enrollment 4.4 Create and upload the text base (PDF) materials in LMS 4.5 Create and upload the audio/video/website materials (weblink) in LMS **Practical Activities** • 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
• 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.	**UNIT V: Learning Activities and Evaluation students' performance (6T+ 6P)** 5.1 Formative and Summative Assessments in online/blended learning 5.2 Assessment: Quiz and Assignments 5.3 Student Engagement and Participation: Chat and Discussion Forum 5.4 Communication and collaboration: Collaborative work, peer work and workshop 5.5 Feedback and Reflection **Practical Activities** • 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

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

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
7. https://scratch.mit.edu
8. https://appinventor.mit.edu
9. https://docs.moodle.org/403/en/Main_page
10. https://edu.google.com/
11. https://learn.microsoft.com/

Tribhuvan University
Faculty of Education
Office of the Dean

BACHELOR OF INFORMATION AND COMMUNICATION TECHNOLOGY EDUCATION
(BICTE)
Seventh Semester Curriculum
(2081)

List of Subjects

Ed. 472: Research Project | **Program: BICTE**

Course No. : Ed. 472 | **Nature of course: Theory + Practical**

Level: Bachelor | **Credit Hours: 3 (2T+1P)**

Semester: Seven | **Teaching hours: 64 Hours(32T+32P)**

---

1. Course Description:

This course provides students with the foundational knowledge and practical skills needed to conduct a research project, culminating in a thesis. Students will learn how to design, conduct, and present research effectively. This course emphasizes critical thinking, methodological rigor, and the articulation of research findings.

2. Course Objectives:

- Develop knowledge and skills in research methodologies and approaches.
- Identify and formulate research questions and hypotheses.
- Conduct literature reviews and synthesize relevant information.
- Design and implement research methods appropriate for the project.
- Competency in collecting and analyzing data using appropriate tools and techniques.
- Write and present a coherent and well-structured research thesis.
- Develop skills in academic writing and formatting.
- Prepare and deliver effective presentations of research findings.

3. Course Details

To achieve the expected outcomes of the course, the contents are organized as follows:

Specific Objectives	Contents
• Analyze the concept of research • Illustrate different research approaches and methodologies • Identify and apply research ethics • Finding and stating the	**Unit 1. Introduction to Research Projects (8 Hours)** 1.1 Overview of research in academia. 1.2 Objectives of Research 1.3 Research Approaches 1.4 Research Methods versus Research Methodology 1.5 Importance of research ethics and integrity. (Ethics Considerations in Research) 1.6 Identifying research gaps and formulating research

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

research gap • Formulating research hypothesis/ research question	hypotheses/questions.
• Develop a research proposal in a step-by-step manner in the chosen problem • State objective, formulate a hypothesis, and determine the methodology for the selected issue •	**Unit 2 Writing the Research Project Proposal (10 Hours)** 2.1 Components of Research Project Proposal 2.2 Structuring a research proposal. 2.3 Develop objectives, hypotheses, and methodology. **Practical** Preparation of research project proposal for contemporary issues such as social issues, circular economic issues, environmental issues, educational, cultural, technology etc.
• Identify related literature • Evaluate the credibility and relevance of various sources • Write a review of related literature	**Unit 3 Review of Related Literature (10 Hours)** **3.1** Conducting a literature review: Systematic review and Thematic review **3.2** Developing conceptual framework **3.3** Verification of authentic sources and integrating findings. **Practical** Review literature for the selected research topic minimum three including books, reports and articles using APA7th Edition.
• **Identify** related research design for a specific topic. • Define the population and use the appropriate sampling technique • Adopt ethical acceptance in the research project • Select the appropriate data	**Unit 4 Major Concepts Regarding Research Design (16 Hours)** 4.1.Qualitative vs. quantitative research methods. 4.2 Population, Sampling procedure (sample size, techniques) 4.3 Tools and techniques for data collection (surveys, interviews, experiments, questionnaires, and Checklist). 4.4 Use of Statistical Measures (Central Tendency, Measures of Dispersion, and Measures of Relationship)

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

collection tool for collecting data 4.1 Apply suitable scales for measuring variables • Explain the technique of analysis and interpretation of data • Interpret the fringing using the support of statistical tools •	4.5 Interpreting data (Frequency, Table, Charts, and graphs) and drawing conclusions 4.6 Ethical considerations and obtaining approvals 4.7 Finding and discussion **Practical** ➢ Develop a research design based on a selected topic including methods, sampling (probability and non-probability). ➢ Develop a research tool and collect data for the selected topic using tools such as google form, ➢ Analysis of data and interpret using suitable tools such as SPSS, NVivo
• Apply the layout and structure of a research report • Develop effective writing skills in academic style with referencing and citations • Prepare and present research findings to peers and instructors, incorporating feedback for improvement, and complete the final submission process	**Unit 5 Preparing and Presenting research report (20 hours)** 5.1 Layout of the Research Report 5.2 Structure of a project report: introduction, literature review, methodology, results, discussion. 5.3 Referencing and citations (APA 7th Editions) 5.4 Finalizing the Research Report. Project: ➢ Develop research project report incorporating unit 2,3,4 practical task and prepare and submit final report in concerned department. ➢ Student present their report. ➢ Peer and Instructor Evaluations. ➢ Reflection and Wrap-up.

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 units. The second group consists of specific

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

instructional techniques applicable to particular units.

4.1 General Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of the multi-media projector, and brainstorming are used in all units.

4.2 Specific Instructional Techniques

A demonstration is an essential instructional technique for all units in this course during the 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:

5. Evaluation

Evaluation of students' performance is divided into parts: Internal assessment (theory and practical and internal External examinations (theory and practical). The distribution of points is given below:

Internal Assessment Theory	Internal Assessment Practical	Semester Examination (Theoretical exam)	External Practical Exam/Viva	Total Points
25 Points	15 Points	40 Points	20 Points	100 Points

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

5.1 Internal Assessment (25 Points) of Theoretical Part

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

Attendance and learning Activities	5 points
First assignment (Written assignment)	5 points
Second assignment (Project work with presentation)	10 points
Third assignment/written examination	5 point
Total	25 points

5.2 Internal Assessment (15 Points) of practical part

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

Attendance and learning Activities	5 points
Practical work/project work/lab work	10 points
Total	15 points

5.3 Semester Final Examination (40 Points) Theoretical part

Examination Division, the Dean's office will conduct the final examination at the end of the semester.	
Objective question (Multiple choice questions 10 x 1 point)	10 Points
Subjective questions (6 questions x 5 marks with 'OR" two questions)	30 Points
Total 40points	

5.1 Practical Exam/Viva (20 Points)

Examination Division, Office of the Dean will appoint an external examiner for conducting the practical examination

Items	Points
Evaluation of Record Book	4
Project work/practical work presentation/skill test	10
Viva	6
Total	20

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

Creswell, J.W. & Plano Clark, V,L (2011). *Designing and conducting mixed methods research*(2nd ed.) Thousands Oak CA: Sage.

Good, C.V. 1996. Essential of Educational research: Methodology and design. New York: Appleton, Century Crofts.

Gronlund, N.E. 1985. Measurement and evaluation in testing (6th edition)New York Collinear Macmillan Publishers.

Kothari,C. R., *Quantitative Techniques*, 2nd edition., New Delhi: Vikas Publishing House Pvt. Ltd

Khanal P., *Research methodology in Education*, 2nd Edition, Sunlight Publication, Kathmandu.

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

ICT. Ed. 473: Geographic Information System

Course No. : ICT. Ed. 473	Nature of course: Theoretical + Practical
Level: Bachelor	Credit hours: 3 (2T+1P)
Semester: Seven	Teaching hours: 64 (32T+32P)

1. Course Description

The aim of the course is to impart knowledge of the basic concepts of geographic information system (GIS) and to help the students build skills for solving problems using it. It provides the students with the basic features of the GIS such as spatial data, reading, analyzing and interpreting maps, GIS data models, finding information in raster system and vector system. It also provides knowledge about pattern analysis which includes networks, statistical surface and topological surfaces. Students are more engaged in laboratory work to realize GIS experiments rather than theoretical concept.

2. General Objectives of the Course

Following are the general objective of this course:

- To make the student knowledgeable about the geographic information system concept.
- To enable the student in implement the map analysis in practices.
- To acquaint the student in organization of geographic objects and to locate them in map.
- To explore the raster model, vector model and representing surface with these models.
- To provide the students with the skills of using GIS tool to solve the real world problems.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Describe geographic information system and its scope. • Explain spatial data and how to think spatially. • Install and configure QGIS app. • Learn to use QGIS interface.	**Unit 1: Introduction to GIS** **[8 Hours]** 1.1 GIS Introduction 1.2 Scope of GIS 1.3 Think Spatially **Practical Works** • *Installing QGIS* • *Running QGIS for the first time* • *Introducing the QGIS user interface* • *Finding help and reporting issues*
• Categorizing the space on a map.	**Unit 2: Reading, Analyzing and Interpreting Maps [12 Hours]** 2.1 Space Categorization on a map 2.2 Levels of measurement

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

• find the levels of measurement and relationship between data measurement and symbology. • Recognize, analyze, quantify patterns and make decisions. • Make use of QGIS to load raster data, vector data from files and style the layers • Create new vector layers and edit vector geometries	2.3 Relationship between symbology and data measurement 2.4 Pattern Recognition - Random, Clustered, Uniform distributional patterns 2.5 Pattern Analysis and Quantification 2.6 Result Interpretation and Decision Making **Practical Works** Use QGIS Application to perform following task: • *Loading vector data from files* • *Loading raster files* • *Styling raster layers* • *Styling vector layers* • *Creating new vector layers* • *Editing vector geometries* • *Editing attributes*
• Describe GIS data models • Elaborate Raster model and vector model. • Represent surface in raster and vector models. • Use QGIS tool to analyze raster data, combine raster and vector data. • Design printing maps and present map online.	**Unit 3: GIS Data Model [14 Hours]** 3.1 Raster Model and Structure 3.2 Vector Representation 3.3 Surface Representation in Raster Model 3.4 Surface Representation in Vector Model **Practical Works** Use QGIS Application to perform following task: • *Analyzing raster data* • *Combining raster and vector data* • *Leveraging the power of spatial databases* • *Advanced vector styling* • *Labeling* • *Designing print maps* • *Presenting your maps online*
• Define Geographic objects.	**Unit 4: Searching for Geographic Objects [12 Hours]** 4.1 Finding Information in Raster Systems 4.2 Finding Features in Vector Systems

• Demonstrate searching different geographic objects in GIS. • Extract, transform and load vector data and visualize GIS data. • Make use of Postgres with PostGIS and pgRouting. • Elaborate database importing and topological relationships. • Establish travel time isochron polygons.	4.3 Searching Polygons in a GIS 4.4 Locating 2-D Map Objects 4.5 Defining the Groups for Searching **Practical Works** Use QGIS Application to perform following task: • *Acquiring data for geospatial applications* • *Visualizing GIS data* • *Vector data – Extract, Transform, and Load* • *Raster analysis* • *Publishing the results as a web application* • *Postgres with PostGIS and pgRouting* • *OpenStreetMap data for topology* • *Database importing and topological relationships* • *Creating the travel time isochron polygons*
• Clarify the concept of distance measurement. • Analyze different geographic patterns • Explain statistical surface, topological surface and networks. • Measure connectivity and direct traffic in roads • Make use of Road graph plugin. • Calculate the shortest paths using the Road graph plugin • Visualize pgRouting result in QGIS tool • Automate multiple route computation using batch processing	**Unit 5: Geographic Pattern Analysis [18 Hours]** 5.1 Distance Measurement -absolute, relative, functional distance 5.2 Statistical Surfaces Characteristics, working with surface data, predicting values with interpolation 5.3 Topological Surfaces 5.4 Networks - Connectivity measurement, impedance values, one way paths, circuits, turns and intersections, directing traffic and exploiting networks **Practical Works** Use QGIS Application to perform following task: • *Creating a simple routing network* • *Calculating the shortest paths using the Road graph plugin* • *Routing with one-way streets in the Road graph plugin*

	• *Calculating the shortest paths with the QGIS network analysis library* • *Routing point sequences* • *Automating multiple route computation using batch processing* • *Matching points to the nearest line* • *Creating a routing network for pgRouting* • *Visualizing the pgRouting results in QGIS* • *Using the pgRoutingLayer plugin for convenience* • *Getting network data from the OSM*

Note: The figures in square brackets indicate approximate teaching hours allotted to respective units.

4. General Instructional Techniques

Lecture preferably with the use of multi-media projector, demonstration, practical classes, discussion, and brain storming in all units as far as practicable.

4.1 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. The details of suggested instructional techniques are presented below:

Units	Activities
Unit 1 to 5	• QGIS tool is used to elaborate each units concepts • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback • Demonstration by the teacher on practical works mentioned in each unit • Lab work individually or in pairs is assigned by the teacher to understand each unit • Assignment should be assigned to prepare lab report/project report for individual student

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 Theory	Internal Assessment Practical	Semester Examination (Theoretical exam)	External Practical Exam/Viva	Total Points
25 Points	15 Points	40 Points	20 Points	100 Points

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

5.1 Internal Evaluation (25 Marks):

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

Attendance and learning Activities	5 points
First assignment (Written assignment)	5 points
Second assignment (Project work with presentation)	10 points
Third assignment/written examination	5 point
Total	25 points

5.2 Internal Assessment (15 Points) of the practical part

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

Attendance and learning Activities	5 points
Practical work/project work/lab work	10 points
Total	15 points

5.3 Semester Examination (40 Marks)

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

• Objective question (Multiple choice questions 10 x 1 point)	10 Points
• Short answer questions (6 questions x 5 marks with Two OR questions)	30 Points
Total 40points	

5.4 Practical Exam/Viva (20 Points)

Examination Division, Office of the Dean will appoint an external examiner for conducting the practical examination

Items	Points
Evaluation of Record Book	4
Project work/practical work presentation/skill test	10
Viva	6
Total	20

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

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

6.1 Prescribed Textbook

DeMers, M. N. *GIS For Dummies,* For Dummies

Graser, A. et al. *QGIS Becoming a GIS Power User*-Packt Publisher

6.2 Recommended Books

Bolstad, P. & Manson, S. (2022). *GIS Fundamentals A first text on Geographic information systems (7th Ed.)*, Eider Press

Bearman, N. (2021). *GIS Research Methods (1st Ed.),* Bloomsbury Academic

Wegmann, M. et al. (2020). *An introduction to spatial data analysis (1st Ed.),* Pelagic Publishing

Shekhar, S., Xiong, H. & Zhou, X. (2017). *Encyclopedia of GIS (2nd Ed.),* Springer International Publishing

Dale, P. (2014). *Mathematical Techniques in GIS* (2nd Ed.), CRC Press

ICT. Ed. 474: Multimedia in Education

Course No.: ICT. Ed. 474	Nature of course: Theoretical
Level: Bachelor (BICTE)	Credit Hour: 3(2T+1P) hours
Semester: Seven	Teaching Hour: 64(32T+32P) hours

1. Course Description

This course provides complete instruction in the creation and manipulation of digital media, covering key elements of image, audio, and video processing, as well as live broadcasting. Students will gain practical skills in using various multimedia authoring tools and methodologies, equipping them to create excellent digital content for educational and professional applications.

2. General Objectives

The general objectives of this course are as follows:

- To define the scope and applications of multimedia in education utilizing various authoring tools and digital media formats.
- To demonstrate the image capture and manipulation techniques for enhanced visual appeal of educational resources.
- To record and edit high-quality audio files for educational podcasts and other platforms.
- To develop professional educational video clips with engaging visual effects.
- To implement live streaming through mobile applications, audio live podcasting, and other platforms for educational purposes.

3. Course Outlines:

Specific Objectives	Contents
• Explain the definition and scope of multimedia. • Identify and describe the components of multimedia. • Explore the applications of multimedia in education and future trends.	**Unit I: Introduction to multimedia (6 Hours)** 1.1 Definition and scope 1.2 Components of multimedia 1.3 Applications of multimedia in education 1.4 Multimedia authoring tools 1.5 Digital media formats and standards 1.6 Current trends in multimedia

• Describe media file formats and standards. • Utilize multimedia authoring tools.	
• Define the basics of digital photography concept. • Describe image formats and compression techniques. • Remove unwanted objects from images. • Fix lighting issues and make adjustment to improve image quality. • Demonstrate tasks about layers, filters, and text to enhance images.	**Unit II: Capture and Manipulate Image (12 Hours)** 2.1 Basics of Digital Photography 2.2 Image format and compression 2.3 Removing Unwanted Objects 2.4 Fixing Lighting Issues with Adjustments 2.5 Working with Layers 2.6 Exploring Filters 2.7 Adding Text to an Image ***Practical Tasks:*** • Remove unwanted objects from an image. • Improve image quality by adjusting lighting issues • Work with multiple layers to create a composite image • Apply and explore various filters to enhance an image • Add and style text within an image
• Describe concept of audio. • Differentiate and utilize various audio file formats. • Record and edit audio clips, performing simple edits and splitting tracks. • Manage audio tracks by labeling and adding new tracks. • Improve audio quality through noise reduction, normalization, and speed adjustment. • Apply metadata and export audio files for various uses, including	**Unit III: Audio Recording and Editing (12 Hours)** 3.1 Concept of audio 3.2 Audio file format 3.3 Recording and Editing Audio 3.4 Track Management: Labeling Tracks, Adding Tracks 3.5 Audio Enhancement: Noise Reduction and Normalization, Adjusting Audio Speed 3.6 Metadata and Exporting: Adding Metadata, Exporting Audio 3.7 Live Recording **on social media** ***Practical Tasks:*** • Record a short audio clip, perform simple edits, and split the track.

live recording for social media sharing.	• Manage multiple tracks within a project • Enhance audio quality using noise reduction, normalization, and speed adjustment. • Add metadata to a project and export the final audio file • Record a live session and prepare it for social media sharing
• Describe video file format compression techniques. • Demonstrate video recording methods and skills. • Trim and cut video clips effectively. • Merge multiple video clips into a cohesive single video. • Overlay and style text for titles, captions, and subtitles. • Adjust brightness and saturation to enhance video quality. • Create smooth animations using keyframes and apply filters and effects for improved visual appeal.	**Unit IV: Video Capturing and Editing (10 Hours)** 4.1 Video file format compression 4.2 Video recording methods and skills 4.3 Trimming and Cutting Clips 4.4 Merging Clips 4.5 Adding Text 4.6 Adjusting Brightness and Saturation 4.7 Keyframe Animation ***Practical Tasks*** • Remove unwanted sections or create shorter segments from video clips • Combine multiple video clips into a single video • Overlay text for titles, captions, or subtitles • Enhance the visual quality of a video by adjusting brightness and saturation. • Create smooth animations using keyframes • Enhance the video with background music • Apply filters and effects to enhance the video's visual appeal.
• Describe the concept of live streaming. • Utilize mobile applications for live streaming on platforms like Facebook Live or Instagram Live or TikTok.	**Unit V: Online Broadcasting (22 Hours)** 5.1 Concept of live streaming 5.2 Mobile application and live streaming 5.3 Audio Live podcasting 5.4 Video and live streaming ***Practical Tasks***

• Set up and execute audio live podcasting, including arranging essential equipment. • Demonstrate video live streaming techniques using OBS or YouTube. • Evaluate and reflect on student learning through live streaming sessions.	• Demo live streaming using mobile application such as Facebook live, Instagram live, ticktack for student learning reflection. • Demo **Audio Live Podcasting include a**rranging essential equipment such as microphones, headphones, and audio interfaces in a dedicated space. • Demo Live Streaming Using OBS or YouTube

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 Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of multi-media projector, brain storming are used in all units.

4.2 Specific Instructional Techniques

The demonstration is an essential instructional technique for all units in this course during teaching teaching-learning process. Specifically, demonstration with practical works will be a specific instructional technique in this course. The following tools and applications can use for classroom teaching.

Unit	Issues	Suggestive tools/application
2	Image capturing and editing	Use any one or more tools/application such as Adobe Photoshop, Pixlr, GIMP (GNU Image Manipulation Program), Paint.NET, Canva or similar online or offline tools
3	Audio capturing and editing	Use any one or more tools/application such Adobe Audition, Audacity, GarageBand, FL Studio or similar

		online or offline tools.
4	Video capturing and editing	Use any one or more tools/application such Adobe Premiere Pro, Final Cut Pro, DaVinci Resolve, Cap Cut or similar online or offline tools.
5	Broadcasting and Live Streaming	Use any one or more tools/application such OBS Studio (Open Broadcaster Software), Facebook Live, YouTube Live, Instagram Live, X (formerly Twitter) or similar online or offline tools

5. Evaluation:

Evaluation of students' performance is divided into parts: Internal assessment (theory and practical and internal External examinations (theory and practical). The distribution of points is given below:

Internal Assessment Theory	Internal Assessment Practical	Semester Examination (Theoretical exam)	External Practical Exam/Viva	Total Points
25 Points	15 Points	40 Points	20 Points	100 Points

***Note**: Students must pass separately in internal assessment and semester examination.*

5.1 Internal Evaluation (25 Marks):

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

Attendance and learning Activities	5 points
First assignment (Written assignment)	5 points
Second assignment (Project work with presentation)	10 points
Third assignment/written examination	5 point
Total	25 points

5.2 Internal Assessment (15 Points) of the practical part

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

Attendance and learning Activities	5 points
Practical work/project work/lab work	10 points
Total	15 points

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

5.3 Semester Examination (40 Marks)

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

Objective question (Multiple choice questions 10 x 1 point)	10 Points
Short answer questions (6 questions x 5 marks with Two OR Questions)	30 Points
Total points	40

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:

Maxim, J. (2024). *Adobe Premiere Pro: 2024 release*. Adobe Press.

Costello, V. (2023). *Multimedia foundations: Core concepts for digital design*. Elsevier Focal Press.

Carlson, J. (2020). *Adobe Photoshop Elements 2021 Classroom in a Book* (1st edition). Adobe Press.

Maxim, J. & Adobe Creative Team. (2019). *Adobe Audition CC Classroom in a Book (2nd Ed)*. Adobe Press.

Audacity. (2024, July 16). *Tutorials for Audacity - Audacity Manual*. Manual.audacityteam.org. https://manual.audacityteam.org/man/tutorials_for_audacity.html

Bailey, L. (2024). *Welcome to OBS Studio's documentation! — OBS Studio 29.1.1 documentation*. Docs.obsproject.com. https://docs.obsproject.com/

CapCut. (2023). *CapCut Online Tutorials | Explore, Learn, and Create Videos and Images with Ease*. Www.capcut.com. https://www.capcut.com/tutorial

ICT. Ed. 477: Python Programming

Course No. : ICT. Ed. 477 | Nature of course: Theoretical + Practical
Level: Bachelor | Credit hours: 3 (2T+1P)
Semester: Seventh | Teaching hours: 64 (32T+32P)

1. Course Description

The aim of the course is to impart knowledge of the basic concepts of python programming and to help the students build skills for solving problems using it. It provides the students with the basic features of the language such as data types, operators, control structure, list, dictionaries, sets, tuples, string manipulation, functions, exception and file handling which are the common features of programming languages. It also provides knowledge about object-oriented paradigm, database programming and building graphical user interfaces. Students are more engaged in laboratory work to exaction of programing experiments rather than theoretical concept.

2. General Objectives of the Course

Following are the general objective of this course:

- To make the student knowledgeable about the python programming concept.
- To enable the student in implement the essential programming concepts and methods in practices.
- To acquaint the student in organization of data in lists, dictionaries, sets and tuples.
- To explore the database programming, graphical user interface programming using python.
- To provide the students with the skills of object orientated programming to solve the real-world problems.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Write and Execute Python Program • Describe basic structure of python program, data types, variables, operators, comments and constants. • Perform input and output operation • Explore print function and display formatted output with f-string	**Unit 1: Python Programming Fundamentals [8 Hours]** 1.4 Python Introduction 1.5 Data Types and Type Conversion 1.6 Comments 1.7 Variables, Constants, Operators and Performing Calculations 1.8 Reading Input from Keyboard 1.9 Print function, Displaying Formatted Output with F-strings **Practical Works** • *Write program to illustrate variables, constants, data types and type conversion.* • *Write program to demonstrate different types of operators available in python and perform calculations.*

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

	• *Write program to make use of I/O functions.*
• Explain control statements. • Write decision making problems using if, match, break and continue statements • Apply different types of loop and make distinction among them through program. • Discuss different problems and how they are transformed to programs using nested loop and infinite loop. • Demonstrate skills to write program using control statements in Python	**Unit 2: Control Statements in Python [8 Hours]** 2.7 if statement 2.8 match statement 2.9 break statement 2.10 continue statement 2.11 Loop statement 2.11.1 while 2.11.2 for 2.12 Nested loop 2.13 Infinite loop **Practical Works** • *Write program to apply if, match, break and continue statements for decision making.* • *Write program to utilize different loop statements to solve meaningful problems.* • *Write program to demonstrate input validation using loop.* • *Write program to create different patterns using nested loop.* • *Write program to make use of infinite loop.*
• Describe List, Tuples, Dictionary, Sets and Strings in python • Elaborate List Comprehension, Dictionary operations, Set Operations, Tuples Operations, List slicing. • Solve simple computing problems using List methods.	**Unit 3: List, Tuple, Dictionaries, Sets and Strings [16]** 3.1 Introduction to Lists - List Slicing, in operator, List Methods : append, index, insert, sort, remove, reverse, min, max 3.2 List Comprehension 3.3 Two-Dimensional Lists 3.4 Tuples 3.5 Dictionaries - Creating dictionary, retrieving, adding and removing elements 3.6 Sets - Creating Set, Adding and Removing Elements

• Use different string methods to manipulate strings. • Describe Searching and Sorting problem. • Demonstrate skills for writing program	-Set Operations: union, intersection, difference 3.7 Strings - String Operations : Slicing, Testing, Searching, and Manipulating **Practical Works** • *Write program to create list, add elements in list, remove elements from list and display list items.* • *Write program to make use of list slicing concept to display elements of list.* • *Write program to elaborate different list methods.* • *Write program to apply list comprehension.* • *Write program to illustrate two-dimensional list.* • *Write program to create tuple, add elements in tuple, remove elements from tuple and display tuple items.* • *Write program to create dictionary, add elements in dictionary, remove elements from dictionary and display dictionary items.* • *Write program to create set, add elements in set, remove elements from set and display set items.* • *Write program to perform set operations.* • *Write program to make use of string manipulation methods and also perform different string operations.*
• Define object oriented paradigm with python • Demonstrate class and object with data hiding concept • Describe the use of self-keyword in programs. • Compare and contrast different types of inheritance. • Elaborate polymorphism concept	**Unit 4: Object Oriented Programming with Python [10 Hrs]** 4.1 Class and Object 4.2 __init__ method 4.3 self keyword 4.4 Inheritance 4.5 Polymorphism and Data Hiding **Practical Works** • *Write program to elaborate object oriented concept with simple examples.* • *Write program to make use of __init__ method to initialize objects.* • *Write program to apply different types of inheritance.*

	• *Write program to elaborate polymorphism and data hiding concept.*
• Clarify the concept of functions. • Create function with arguments, without arguments, returning values. • Describe exception and how to handle them in programs. • Explain the use of file in program. • Demonstrate the file operations with examples.	**Unit 5: Function, Exception and File Handling [10 Hours)]** 5.1 Introduction to Functions 5.2 Defining and Calling Function 5.3 Passing Arguments to Functions 5.4 Value-Returning Functions 5.5 Introduction to File Input and Output 5.6 Using Loops to Process Files 5.7 Exception Handling **Practical Works** • *Write program to divide work in functions.* • *Write different variety of functions: function with arguments, value returning function, function without arguments.* • *Write program to store output in file.* • *Write program to read input from file.* • *Write program to handle different types of exception.*
• Discuss the use of database and GUI programming. • Demonstrate CRUD operation in database. • Design simple GUI with frames and widgets. • Perform simple calculations using GUI. • Draw different geometrical shapes using canvas	**Unit 6: Database and GUI Programming [12 Hours]** 6.1 Opening and Closing Database Connection with SQLite 6.2 Creating and Deleting Tables 6.3 Adding Data to a Table 6.4 CRUD Operations 6.5 Using the tkinter Module 6.6 Working with Widgets - Displaying Text with Label, Button, Info Dialog Boxes, Getting Input with the Entry, Using Labels as Output Fields, Radio and Check Buttons 6.7 Organizing Widgets with Frames 6.8 Drawing Shapes with Canvas Widget **Practical Works** • *Write program to establish connection with database and create or delete database and table.*

	• *Write program to store data in database and manipulate the data.* • *Write program to perform CRUD operation in database.* • *Write program to create simple GUI with widgets: label, text entry, radio buttons, check buttons* • *Write program to organize the different widgets with frame to create attractive designs.* • *Write program to draw different geometrical shapes using canvas widget.*

Note: The figures in square brackets indicate approximate teaching hours allotted to respective units.

4. **General Instructional Techniques**
Lecture preferably with the use of multi-media projector, demonstration, practical classes, discussion, and brain storming in all units as far as practicable.

5. **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. The details of suggested instructional techniques are presented below:

Units	Activities
Unit 1 to 6	• Code writing activity is performed to elaborate each units concepts • Monitoring of students' work by reaching each student and providing feedback for improvement • Presentation by students followed by peers' comments and teacher's feedback • Demonstration by the teacher on practical works mentioned in each unit • Lab work individually or in pairs is assigned by the teacher to understand each unit • Assignment should be assigned to prepare lab report/project report for individual student

6. **Evaluation**

Evaluation of students' performance is divided into parts: Internal assessment (theory and practical and internal External examinations (theory and practical). The distribution of points is given below:

Internal Assessment Theory	Internal Assessment Practical	Semester Examination (Theoretical exam)	External Practical Exam/Viva	Total Points
25 Points	15 Points	40 Points	20 Points	100 Points

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

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

6.1 Internal Assessment (25 Points) of Theoretical Part

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

Attendance and learning Activities	5 points
First assignment (Written assignment)	5 points
Second assignment (Project work with presentation)	10 points
Third assignment/written examination	5 point
Total	25 points

6.2 Internal Assessment (15 Points) of the Practical Part

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

Attendance and learning Activities	5 points
Practical work/project work/lab work	10 points
Total	15 points

6.3 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 point)	10 Points
Short answer questions (6 questions x 5 marks with Two 'OR' Questions)	30 Points
Total	40 points

6.4 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

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

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

7.1 Prescribed Textbook

Tony Gaddis, T. (2021). *Starting out with Python (5th Ed.).* Pearson

7.2 Recommended Books

Hetland, M.L. & Nelli, F. (2024). *Beginning Python from Novice to Professional (4th Ed.)*, Apress

Murugesh, T.S., Vasudevan, S.K. & Pulari, S.R. (2024). *Python: A Practical Learning Approach (1st Ed.)*, CRC Press

Zuckarelli, J.L. (2024). *Learn coding with Python and JavaScript A practical introduction for beginners (1st Ed.)*, Springer

Barry, P. (2023). *Head First Python: A Learner's Guide to the Fundamentals of Python Programming (3rd Ed.)*, O'Reilly Media

Liu, M. (2021). *Make Python Talk Build Apps with Voice Control and Speech Recognition (1st Ed.),* No Starch Press

ICT. Ed. 478: Teaching Method in ICT Education

Course No.: ICT. Ed. 478 | Nature of course: Theoretical
Level: Bachelor | Credit Hour: 3
Semester: Seven | Teaching Hour: 48

1. Course Description

Teaching methods in Information and Communications Technology (ICT) include the various instructional approaches and strategies applied to deliver ICT-related knowledge and skills to students efficiently. The methods used could include hands-on computer lab sessions, interactive multimedia presentations, online learning modules, collaborative projects, and problem-based learning activities that actively involve students in the practical implementation of ICT ideas. The course aims to give students a comprehensive understanding of ICT tools, software, programming, and digital literacy, and endow them with the necessary understanding and abilities for the digital era.

1. General Objectives

The general objectives of this course are as follows:

- To explore innovative teaching methods to enhance instructional effectiveness and engage students in a technology-rich environment.
- To create comprehensive lesson plans to optimize student learning experiences.
- To design and apply strategies for utilizing ICT tools effectively in the classroom.
- To utilize ICT tools for student assessment, online assessments, and digital portfolio management, providing constructive feedback.
- To explore emerging technologies in education to stay updated with advancements and best practices in teaching methods.

2. Course Outlines:

Specific Objectives	Contents
• Explain pedagogy and andragogy concepts for effective teaching strategies across age groups. • Describe flipped classroom models • Explain online and face-to-face instruction to create flexible, cohesive blended learning experiences. • Explore gamification elements to enhance motivation and engagement. • Explore real-world problems, collaboration, and critical thinking concept. • Describe inquiry-based learning	**Unit I: Innovative teaching methods (6 Hours)** 1.1 Concept of Pedagogy and Andragogy 1.2 Flipped Classroom 1.3 Blended Learning 1.4 Gamification 1.5 Project-Based Learning (PBL) 1.6 Inquiry-Based Learning

• Create learning objectives to guide session planning and measure student progress effectively. • Create lesson plans that align with objectives, ensuring structured and engaging content delivery. • Incorporate ICT tools seamlessly into lesson plans to enhance learning and student interaction. • Develop strategies for effective time management and pacing to maintain lesson flow and student engagement. • Design lessons with interactive elements to actively involve students and promote hands-on learning.	**Unit II: Session Planning and Design (10 Hours)** 2.1 Determine Learning Objectives 2.2 Designing Effective Lesson Plans 2.3 Integrating ICT Tools into Lesson Plans 2.4 Time Management and Pacing 2.5 Designing Interactive Lessons
• Design strategies for effective ICT tool use in the classroom. • Plan management for a technology-enhanced classroom environment. • Create a plan for facilitating collaborative learning among students. • Use gamification, quizzes, and polls to enhance student engagement. • Engage students using social media for interactive learning.	**Unit III: Classroom Teaching Strategies (12)** 3.1 Strategies for effective use of ICT tools 3.2 Design Technology-enhanced classroom 3.3 Design collaborative learning 3.4 Student engagement using gamification, interactive quizzes and polls 3.5 Post-class engagement using social media
• Assess student performance using ICT tools effectively. • Implement online assessments and manage e-portfolios efficiently. • Provide feedback to students through digital channels. • Use data-driven insights for educational decision-making.	**Unit IV: Evaluation and Feedback (8)** 4.1 Assessing Student Performance with ICT 4.2 Online Assessments and E-Portfolios 4.3 Providing Feedback through Digital Means 4.4 Data-Driven Decision Making in Education
• Explore emerging technologies for future educational applications. • Prepare strategies for future classroom technology integration. • Analyze case studies of innovative ICT classroom practices. • Develop a comprehensive semester plan incorporating ICT method.	**Unit V: Future Direction ICT teaching methods (12)** 5.1 Emerging Technologies in Education 5.2 Preparing for the Future Classroom 5.3 Case Studies of Innovative ICT Practices in classroom 5.4 Project about complete plan of one semester

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 particular units.

4.1 General Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of multi-media projector, 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. Evaluation :

Internal Assessment	Semester Examination	Total Marks
40 Marks	60 Marks	100 Marks

Note: Students must pass separately in internal assessment and semester examination.

5.1 Internal Evaluation (40 Marks):

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

• Class Attendance	5 Marks
• Learning activities and class performance	5 Marks
• First assignment (written assignment)	10 Marks
• Second assignment (Case Study/project work with presentation)	10 Marks
• Terminal Examination	10 Marks
Total	40 Marks

5.2 Semester Examination (60 Marks)

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

Objective question (Multiple choice 10 questions x 1 mark)	10 Marks
Subjective short answer questions (6 ques with Two OR ques x 5 marks)	30 Marks
Long answer questions (2 ques with One OR ques x 10 marks)	20 Mark
Total	60 Marks

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

6. Recommended Books and Reference Materials

6.1. Recommended Books:

Huang, R., Spector, J.M., & Yang, J. (2019). *Educational Technology*. Springer Berlin, Heidelberg.

Wang , Y. (Ed.) (2011). *Education and Educational Technology*. Springer-Verlag Berlin Heidelberg

Agarwal, J.C. (2008): *Essentials of Educational Technology: Innovations In Teaching Learning.* New Delhi: Vikas Publishing House Pvt. Ltd.

6.2. References materials:

Kolb, L. (2017). Learning first, technology second: The educator's guide to designing authentic lessons (First edition). Portland, Oregon: International Society for Technology in Education.

Radha Mohan. (2007). Innovative science teaching. New Delhi: Prentice-Hall of India Private Limited.

Mangal, S. K., & Mangal, U. (2012). Essentials of educational technology. New Delhi: PHI Learning Pvt. Ltd.

ICT. Ed. 479: Educational Project

Course No. : ICT. Ed. 479 | Nature of Course: Practical
Level: Bachelor | Credit Hours: 3
Semester: Seven | **Teaching Hours: 80**

1. **Course Description**

This course requires students to complete a major information systems project. Students are to demonstrate a capacity to work in the computing field at a professional level. Students are expected to manage their resources to initiate, plan, estimate, and carry out educational information systems project following appropriate standards. It develops students' skills regarding analysis, design, and development of meaningful real-world applications. This course introduces planning and completing project work related to computer software under the supervision of an instructor or a supervisor.

2. **General Objectives**

On completion of this course, the students will be able to:

- Develop the ability of a student to tackle, a selected problem to a reasonable depth of understanding
- Develop the ability of a student to organize and produce a professional software/website
- Develop the ability of a student to produce technical documentation to a high standard
- Develop the ability of a student to produce an analytical report which communicates the work carried out in the project and evaluates the final product and the student's contribution

3. **Description of the Project Work**

The work carried out must be a practical, problem-solving project. It should be a realistic project in the sense that the product should be useful practically as far as possible.

3.1 Group Formation

Students can perform project individually or in a group (maximum of 4 students).

3.2 Procedure

The students should exercise the following three phases for this course.

- Proposal Submission
- Mid-Term Defense
- Final Project Submission and Defense

a. Proposal Submission:

- Students (s) prepare proposal documents in the prescribed format and submit to the Department of ICTE in the College.
- The HOD/Program Coordinator or a panel coordinated by him/her evaluates the proposal with or without a presentation from the student(s).
- If the proposal is accepted; a Supervisor is assigned by HOD/Coordinator

depending upon the nature of the project

b. Mid Term Defense:
   - The project team has to face a Mid Term Defense after first 40% to 60% of the project duration so that the supervisor and internal evaluator are assured of the progress of the project.

c. Final Defense:
   Project team submits a complete project report in the prescribed format to the department
   - The department then schedules the day for final defense
   - External Supervisor will be decided and will be called for the final defense
   - The project team needs to give presentation, followed by viva question answer session.

3.3 Prescribed Format of the Proposal

- Introduction
- Problem Statement
- Objective
- Scope and Limitation
- Methodology
  a. Requirement Identification
     - Study of existing system
     - Requirement collection
  b. Feasibility Study
     - Technical
     - Operational
     - Economical
  c. Tools
     - Analysis and Design Tools
     - Implementation tools (Front End, Back End)
- High level design of Proposed System (by system flow chart, use cases or other appropriate diagrams
- Gantt Chart to show the project planning.
- Expected Outcome

3.4 Prescribed Format of the Project Report

The sequence in which the project report material should be arranged is as follows:

- Cover page and Title
- Candidate's Declaration
- Supervisor's Certificate/ Recommendation
- Internal, External Examiners' Approval
- Acknowledgements

- Executive Summary
- List of Figures
- List of Tables
- Abbreviations
- Table of Contents
- Main Body
- References / Bibliography
- Appendix

3.5 Number of Copies to be submitted to the Department

Three hard copies of the report are to be submitted to the Department after corrections done as suggested by the guide/Department at any time when report submission is called by the guide/Department. The total number of reports to be prepared are three:

- One copy to the college
- One copy for the University
- One copy to the candidate

Before taking the final printout, the approval of the concerned guide is mandatory, and Suggested corrections, if any, must be incorporated. The reports submitted to the department/guide(s) must be hard bounded with black cover with golden color alphabets.

3.6 Standard to be followed

The report must be printed on one side only. Please use a high-resolution printer, preferably a laser printer with at least 300 dpi.

A. *Page Layout*
   Your paper must use a page size corresponding to A4 which is 210mm *(8.27")* wide and 297mm (11.69") long.
   The margins must be set as follows:
   - Top = 1 inch
   - Bottom = 1 inch
   - Left = 1.25 inch
   - Right = 1 inch

B. *Page Style*
   - All paragraphs must be indented. All paragraphs must be justified aligned with 1.5 spacing

C. *Text Font of Entire Document*
   - The entire document should be in Times New Roman.
   - The font size has to be 12pt throughout

D. *Section Headings*

- No more than 3 levels of headings should be used.
- Font size for the headings will be 16pt, 14pt, 12pt bold

E. *Figures and Tables*
- Position figures and tables at the tops and bottoms pages. Tables and figures may be full-page width or may be partial page.
- Width with wrap on either side.
- Figure captions should be centered below the figures. Table captions should be centered above.
- Caption font size: Times New Roman 10pt bold
- Table Numbering: ChapterNo.TableCount (eg. Table 1.1, Table 1.2, Table 3.1, Table 3.5)
- Figure Numbering: ChapterNo.FigureCount (eg. Figure 2.1, Figure 2.4, Figure 5.1)

F. *References*
- For reference students must follow APA (latest version) format.

4. Evaluation:

Proposal	Mid-Term Defense	Final Defense	Total Marks
10 Points	30 Points	60 Points	100 Points

4.1 Evaluators:
- Project Supervisor (Mentor of the project) -40%
- Internal (HOD/Program Coordinator or decided by Coordinator) -20%
- External Supervisor -40%

4.2 Duration (for 1 group)
- Presentation 20 minutes
- Viva 15 minutes
- Demonstration 15 minutes
- Report checking 10 minutes

Faculty of Education
Office of the Dean
Balkhu, Kathmandu

Tribhuvan University

Faculty of Education

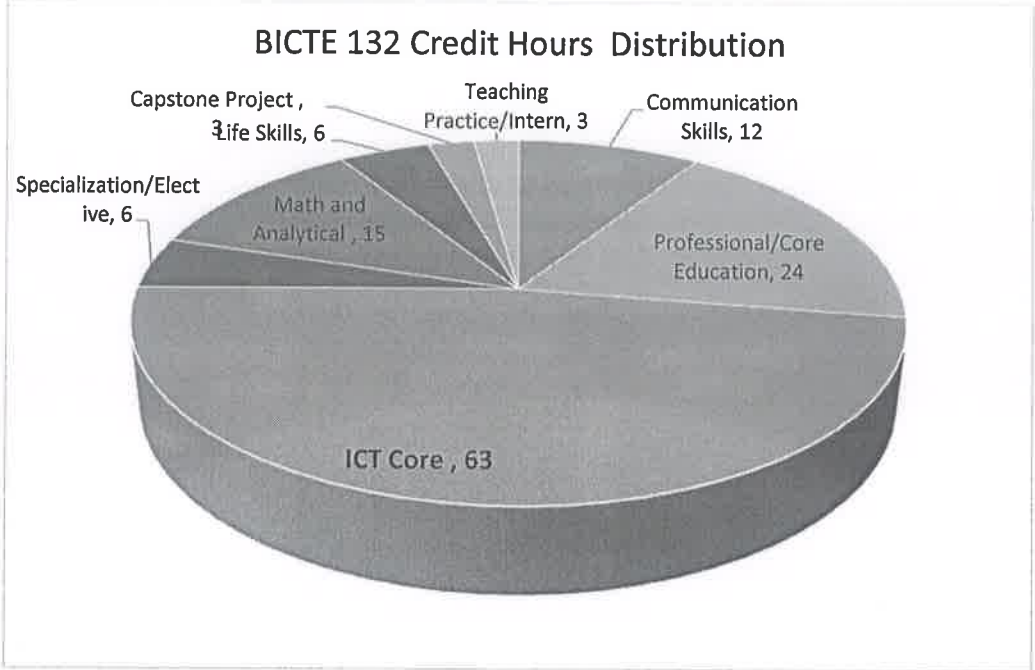
Office of the Dean

BACHELOR of INFORMATION and COMMUNICATION TECHNOLOGY EDUCATION (BICTE)

EIGHT SEMESTER COURSE

Effective form 2021

4 Year 8 Semester
Bachelor of ICT Education (BICTE) Course
Effective from the Administration Batch 2078 BS



S.N.	Course Categories	Semester								Total Course	Total Credit Hours (3 Credit to each)
		1st	2nd	3rd	4th	5th	6th	7th	8th		
1	Communication Skills	2	2	-	-	-	-	-	-	4	12
2	Professional/Core Education	1	1	1	1	1	1	1	1	8	24
3	ICT Core Courses	2	2	3	3	3	4	2	2	21	63
4	Specialization/Elective	-	-	-	-	-	-	1	1	2	6
5	Math and Analytical Course	1	1	1	1	1	-	-	-	5	15
6	Life Skills	-	-	1	1	-	-	-	-	2	6
7	Capstone Project	-	-	-	-	-	-	1	-	1	3
8	Teaching Practice/Intern	-	-	-	-	-	-	-	1	1	3
Total		6	6	6	6	5	5	5	5	44	132

शिक्षाशास्त्र संकाय
जनिको कार्यालय
कीर्तिपुर

BICTE (Eighth Semester)

S. N.	Course Code	Course Title	Credit Hours
1	Ed. 482	Classroom Pedagogy	3
2	ICT. Ed. 481	Teaching Practicum in ICT Education	3
3	ICT. Ed. 484	Artificial Intelligence in Education	3
4	ICT. Ed. 486	System Administration using Linux	3
5	ICT. Ed. 488	Cloud Computing (Elective II)	3
6	ICT. Ed. 489	Big Data and Data Analysis (Elective II)	3

Table of Contents

Course Title: **Classroom Pedagogy**
Course Code: Ed. 482
Level: Bachelor
Semester: Eighth

Program: **BICTE**
Nature of Course: Theory
Credit Hours: 3
Teaching Hours: 48

1. Course Description

This course is designed to equip students with pedagogical methods which can be applied across the school level subjects. It intends to provide students with knowledge and skills of pedagogical methods for making classroom teaching learning child/student centered, interactive and joyful. The instructional approaches stated in this course, viz. teacher centered, learner centered, review and reflection can be smoothly transferred in the classroom of Nepalese schools. It also deals with classroom ecology to improve quality of teaching and learning.

2. General Objectives

The general objectives of the course are as follows:

- To familiarize the students with various concepts of pedagogy.
- To clarify roles of teacher and learners for improving classroom teaching learning.
- To enable the students to prepare various instructional plans.
- To enable the students to use lesson plans for classroom delivery.
- To help the students to conceptualize and use relevant methods: teacher and students centered.
- To enable the students to develop sample lesson plans using variety of teaching strategies.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Define pedagogy. • Explain theories of learning. • Relate theories of learning with classroom practices. • Explain different approaches of teaching methods. • Compare and contrast different approaches of teaching methods. • Exemplify inclusive methods.	**Unit 1: Introduction to Pedagogy (5 Hours)** 1.1 Meaning of pedagogy 1.2 Behaviorist, cognitivist, constructivist theories of learning 1.3 Teacher centered and student centered 1.4 Inclusive methods
• Elaborate and analyze roles of teacher and learners in teaching learning. • Discuss classroom ecology and its importance in quality teaching and learning	**Unit 2: Teacher, Learners and Classroom (7 Hours)** 2.1 Teacher 2.1.1 Qualities of a good teacher 2.1.2 Teacher in interactive classroom

• Explain different forms of class organizations	2.2 Learners 2.2.1 Learning style 2.2.2 Diversity 2.3 Classroom ecology 2.3.1 Concept: physical and non-physical aspects 2.3.2 Seating arrangement 2.3.3 Classroom display 2.3.4 Class organization: Subject, Grade, Multi-grade multi-level (MGML)
• Justify the need of teaching plan and structuring lesson in terms of students' learning. • Describe different types of instructional plans. • Prepare sample of different types of plans. • Prepare a sample of individualized education plan.	**Unit 3: Instructional Planning (4 Hours)** 3.1 Need for plan and lesson structuring: preparatory, delivery and consolidation 3.2 Types of plans – Annual, unit and daily 3.3 Individualized education plan
• Explain when teacher-centered methods are best to use. • Describe various teacher-centered methods. • Prepare sample lesson plan using teacher-centered methods. • Present sample lesson plan in the classroom.	**Unit 4: Teacher Centered Methods (5 Hours)** 4.1 Direct instruction 4.2 Concept teaching 4.3 Presenting and explaining 4.4 Preparation of sample lesson plan
• Explain when student centered methods are best to use. • Elaborate various categories of student centered methods. • Describe various strategies of student centered approaches under different categories of learning and their use. • Prepare sample lesson plan using different strategies of student centered approaches	**Unit 5: Student Centered Methods (20 Hours)** 5.1 Learner engaged learning category 5.1.1 Concept 5.1.2 Strategies: Brainstorming, Think Pair Share, Directed Reading Activity, Prediction from Terms, Direct Listening Thinking Activity, Text Coding, Know Want to Learn Know – KWL, What? So what? Now what?, Verbalized Learning, Learning Stations 5.2 Cooperative learning category 5.2.1 Concept 5.2.2 Strategies: Paired Reading Paired Summarizing, Reciprocal Teaching, Read Summarize Question, Jigsaw, One Stay Others Stray, Mix Freeze Pair, Pens in the

	Middle, Pyramid Learning, Paragraph Expert, Student Teams-Achievement Division (STAD) 5.3 Problem-based Learning category 5.3.1 Concept 5.3.2 Strategies: Identify Define Explore Act Look (IDEAL), Defining Understanding Planning Evaluating (DUPE), I-Search, Socratic Questioning
• Describe importance of review and reflections. • Explain various strategies of review and reflections. • Discuss reflective approaches.	**Unit 6: Review and Reflection (7 Hours)** 6.1 Concept 6.2 Strategies: Question Answer pair, Classify Categorize Organize, Relay, Guess Who?, Two Truths and A Lie, Snowballing, Question ball and Run to the Board 6.3 Reflective approaches

Note: The figures in the parenthesis indicate the approximate teaching hours for the respective units.

4. Instructional Techniques

4.1 General Techniques

- Direct Instruction followed by discussion/sharing/interaction
- Analyze and relate Nepalese school practices with various concepts to improve classroom practices
- Student preparation and sharing of relevant samples/models
- Sharing, review and discussion in the group and whole class
- Home assignment and self study.

4.2 Specific Instructional Techniques

Teachers are required to use different instructional strategies while teaching the contents of this course from unit 1 to 4. Teachers can adapt and use the following strategies contextually.

Unit	Activity and Instructional Techniques
Unit 1	• Use appropriate strategies such as direct instruction, presenting and explaining, DRA, KWL, PRPS, Reciprocal Teaching as stated in unit five.
Unit 2	• Use direct instruction in most of the content parts of this unit.

	• What? So what? Now What?, Pens in the middle, One Stay Others Stray, RSQ, IDEAL, DUPE strategies as stated in unit five
Unit 3	• Jigsaw, Mix Freeze Pair, Text Coding strategies can be used as stated in unit five.
Unit 4	• KWL and RSQ family strategies can be used as stated in unit five.
Unit 5-6	• Students will work individually, in pair and in group using the strategies to prepare model lesson plans and present them followed by discussion and feedback.

Note: Figures within parenthesis indicate approximate number of teaching hours

5. Evaluation

5.1 Internal Evaluation 40%

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

1) Attendance	5
2) Class Participation	5
3) First Assignment (Group Work based on School visit- Unit 3)	10
4) Second Assignment (Based on Reports on Nepalese Education System Unit 4)	10
5) 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.

Objective Type Question (Multiple Choice Questions)	(10 × 1) = 10
Short Answer Questions (6 Questions with 2 Or)	(6× 5) = 30
Long Answer Questions (2 Questions with 1 Or)	(2 × 10) = 20
Total	60

6. Recommended Books and Reading Materials

Arends, R. I. (2013). *Learning to Teach (8th edition).* New Delhi: McGraw – Hill Education Indian Edition. (Units 1, 2, 4, 5)

Crawford, A; Saul, EW; Mathews, S; and Makinster, J. (2005). *Teaching and Learning Strategies for the Thinking Classroom.* New York: Open Society Institute. (Also available in Nepali translation). (Units 2, 5)

Elliott, S. N., Kratochwill, T. R., Cook, J. L. and Travers, J. F. (2000). *Educational Psychology: effective teaching, effective learning.* New York: McGraw – Hill. (Units 1, 2)

Karmacharya, D. M. (2070 BS). *Teacher and Teaching. (In Nepali).* Kathmandu: Makalu Publication House. (Units 3)

Singh, G. B. (2071 BS). *Active and Thinking Teaching Learning Methods (2nd edition). (In Nepali).* Kathmandu: Jupitar Publications. (Units 2, 3, 4, 5, 6)

Ashman, A. F. and Conway, R. N. F. (1997). *An Introduction to Cognitive Education: Theory and Application.* New York: McGraw – Hill International Edition.

Cotton, J. (2004). *The Complete Guide to Learning and Assessment: Learning Vol. 2.* New Delhi: Crest Publishing House.

DOE. (2010). *Framework of Child Friendly School for Quality Education.* Sanothimi: Author.

DOE/SC. (2005). *Child-friendly Schooling Teachers' Training Manual, 2062.* Kathmandu: Author.

Joyce, B., Weil, M. and Calhoun, E. (2009). *Models of Teaching (8th edition).* New Delhi: Prentice-Hall of India Pvt. Ltd.

Pollard, A. (2006). *Reflective Teaching* (2nd Edition). London and New York: Viva-Continuum.

Udvari-Solner, A. and Kluth, P. (2008). *Joyful Learning – Active and Collaborative Learning in Inclusive Classrooms.* California: Corwin Press. (Units 5, 6)

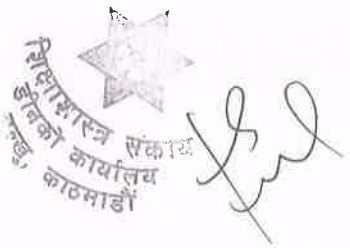
UNESCO. (2004). *Changing Teaching Practices.* Paris: UNESCO.

UNESCO. (2015). *Transforming Teaching and learning in Asia and The Pacific: Case Studies from Seven Countries.* Paris: UNESCO. (http://www.unesco.org/open-access/terms-use-ccbysa-en).

UNICEF. (2003). *Happy Learning! A Guide to Best Practices for Achieving the Potential of Children.* Kathmandu: UNICEF.

Westwood, Peter. (2008). *What teachers need to know about Teaching Methods.* Victoria: Acer Press.

NCED teacher training packages



Course Title: **Teaching Practicum in ICT Education**
Course Code: ICT. Ed. 481
Level: Bachelor
Semester: Eighth

Program: **BICTE**
Nature of Course: Practical
Credit Hours: 3
Duration: 1 Semester

1. Course Description

This course aims to provide hands-on experiences to the students in ICT education equipping them with the skills and opportunity to be become effective teachers and professionals. It creates enabling condtions to the students for bringing professionalism through rigorous practice. It emphasizes professionalism through rigorous practice, enabling students to gain valuable teaching experience in cooperating schools under the close supervision of campus faculty members. In this course has divided into number of activites in sequential phaes: orientation of practice teaching, development of observation guideliences and observation of teaching of school teacher, experience sharing among the students, on-campus micro-teaching, teaching at school, and preparation of overall report.

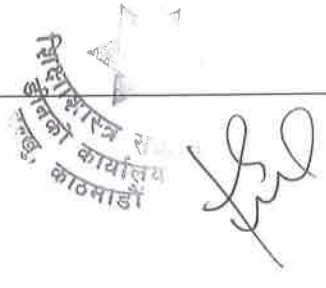
2. General Objectives

The objectives of the course are as follows:

- To Familiarize students with practice teaching principles and develop observation guidelines.
- To enable students to observe and evaluate the teaching methods of school teachers critically, fostering reflection and understanding of effective teaching strategies.
- To provide students with hands-on teaching experiences through on-campus micro-teaching sessions, preparing them for real-world classroom environments.
- To facilitate collaborative learning and experience sharing among students, encouraging teamwork and the exchange of innovative teaching ideas.
- To integrate theoretical knowledge with practical teaching by engaging students in lesson planning, classroom management, and teaching in school settings.
- To guide students in preparing comprehensive reports based on their teaching experiences, promoting critical analysis and reflective learning.

3. Specific Objectives and Activities

Specific Objectives	Major Activities
Phase 1: Orientation of Practice Teaching [2 Days]	
• To introduce students to the phases of the teaching practice program and its structure. • To clarify the requirements and expectations to be fulfilled during the teaching practice.	1.1. Introduction to the phases of teaching practice programme 1.2. Requirements to be fulfilled



Phase 2: Observation of School [One Week]	
• To prepare observation guidelines in consultation with the internal supervisor • Collect subject-relevant information during observation of teaching. • Analyse information, prepare report and share it in the group.	2.1. Preparation of observation guidelines in consultation with internal supervisor for observing the teaching of teacher in computer science. 2.2. Observation of teaching of teachers, computer lab, ICT tools in schools. 2.3. Analysis of information collected from observation of teaching including curriculum, materials, evaluation, computer lab, ICT tools.
Phase 3: Experience Sharing [Four Days]	
• To prepare a brief report summarizing the observations of teaching ~~practices.~~ • To present the observation report at the campus and share experiences with peers and supervisors. • To receive constructive feedback from the supervisor to refine observation and reporting skills.	3.1. Brief report preparation of observation of teaching 3.2. Presentation for sharing experiences of observation report at the campus with feedback from supervisor.
Phase 4: On-Campus Micro-Teaching [1.5 weeks]	
• To define micro-teaching and explain its cycle and relevance in teacher training. • To introduce the concept of reflective practice and its role in improving teaching skills. • To prepare micro-teaching lessons using ICT-integrated pedagogy for teaching computer science. • To demonstrate the delivery of micro-teaching lessons in a simulated on-campus environment.	4.1. Introduction of Micro-teaching and its cycle. 4.2. Reflective practice: learning to teach 4.3. Preparation of micro-teaching lessons for teaching students on computer science with ICT integrated Pedagogy. 4.5. On-Campus simulated micro-teaching practices to develop teaching skills. 4.5 Planning micre teaching sessions, including setting objectives and preparing at least 10 lesson plans with at least 3 teaching lessons (time 10min) 4.6 Peer observation of at least 1 lesson of Micro-teaching with feedback. **(18 students *10min *3teaching=540min/60=9 Hour)**

Phase 5: Peer Teaching on Campus [Two Week]	
• To understand the purpose and benefits of peer teaching in teacher training programs. • To plan and prepare effective peer teaching sessions with clear objectives and lesson plans. • To deliver lessons using ICT tools in a simulated classroom setting. • To develop observation skills by assessing peer teaching practices and providing constructive feedback. • To evaluate teaching effectiveness based on peer feedback and identify areas for improvement.	5.1. Introduction to the purpose and benefits of peer teaching. 5.2. Planning peer teaching sessions, including setting objectives and preparing at least 10 lesson plans. 5.3. Delivering at least 2 lessons using ICT tools in a simulated classroom environment and materials 20 minutes for each of 2 lessons. 5.4. Observing peer teaching and providing constructive feedback. 5.5. Evaluating teaching effectiveness and reflecting on feedback for improvement. 5.6. Integrating theoretical concepts with practical teaching scenarios. 5.7. Conducting a final peer teaching demonstration and receiving feedback. 5.8 Peer observation of at least 2 lesson of Micro-teaching with feedback 18student *2 lesson *20min=720/60=12 Hour)
Phase 6: Teaching at Schools Campus [Six Week]	
• To prepare and deliver 30 ICT pedagogy lessons in a real classroom setting using diverse teaching methods and materials. • To construct and utilize instructional materials, including digital interactive resources, for effective lesson delivery. • To manage the classroom effectively to ensure optimal instruction and learning outcomes. • To observe at least three lessons conducted by peers and provide constructive feedback. • To receive feedback from the internal supervisor by having at least three lessons observed and evaluated.	6.1. Teaching (30 lessons) - Preparing and delivery 30 lessons of the ICT pedagogy in real classroom in cooperating school using different methods and materials - Construction of instruction materials for delivery of lessons including digital interactive materials - Managing classroom for effective instructin and learning 6.2. Peer observation (3 lessons) - Observation of at least 3 lessons of peer's teaching with feedback. - Observation of at least 3 lessons by internal supervisor with his/her feedback. 6.3. Tests - Test construction of both subjectives and objective test item on the basis of the lessons taught - Administration of both tests

• To construct both subjective and objective test items based on the lessons taught. • To administer the tests effectively in the classroom setting. • To analyze and interpret the results of the tests to evaluate learning outcomes and improve teaching strategies.	- Analysis and interpretation of test results.
Phase 7: Preparation of Overall Report [One week]	
• Prepare overall report of teaching practice including all the components as mentioned in phase 7 in the next column	7.1. Preparation of overall report of teaching practice in a given format Title page Acknowledgements Abbrivations Table of Contents Part I: On-Campus activities Background Preparation of instruments for class observation Analysis of observation Brief report including material constructin and lesson learned Part II: Activities in School Analysis of teaching activities carried out in school Analysis of peer observation Assessment of teaching Assessment of teaching Lessons learned Part III: Test Construction, Administration and analysis and interpretation of Test Results (difficulty level and discrimination index) References Appendics

Note: The figures within the parentheses indicate approximate periods allotted to respective activties.

4. Guidelines for Conduction Major Activities

4.1 Orientation of Practicum:

- Conduct a orientation for those campus tutors/supervisors who will be involved in practicum and it will be facilitated by experts from faculty of education/ICT coordinator/chairperson of practice teaching instruction committee of respective campus addressing five parts of the course.

4.2 Activity 1: Experience as a Learner:

On-campus activities	Organization/School/institutes
• Participation in orientation program. • Preparation of guidelines for observing the teaching • Experience share and demonstrate the observation report to internal supervisor.	Observe the minimum three class of computer science or ICT in school with given format. Observe the computer lab and other ICT tools, infrastructure which is related to ICT in education.

4.3 Activity 2: Workshop on Micro-Teaching and Peer Teaching

On-campus activities	Organization/School/institutes
• Prepare the micro-teaching lesson 10 with 3 teaching • Micro-teaching practices with the support of the campus supervisor: • Teach at least 5(3 micro 2 peer) lessons to develop teaching skills using the micro-teaching cycle • Prepare peer observation report 3 (1 micro 2 Peer) with feedback **Note: Group divide up to 18 students in one group if more then 18 divide into multiple group**	

4.4 Activity 3: Teaching Practice Activities

On-campus activities	Organization/School/institutes
• Prepare a comprehensive practicum report including teaching practice, observation of organization in given format and structure.	• Observation of teaching of school or campus teachers. • Study of management and ICT tools and infrastructure at school. • Preparation of at least 30 lesson plans using variety of instructional techniques and ICT integrated pedagogy. • Preparation of teaching aids with the support of interactive multimedia tools. • Teaching of at least 30 lessons. • Improve the lessons through continual repetitions with the suggestions of campus supervisor and concerned subject teacher

	• Observation of at least **three** lessons of peers' teaching and prepare its report after analyzing the results and provide knowledge of results to both students • Preparation of a report of in-depth case study • Report preparation along with the record of all the activities conducted during practicum period.

5 Evaluation of Practicum

The evaluation process is divided into two sperate part. The first part is teaching practices and second part is internships. Marks and evaluation process are given following table.

Part 1: Teaching Practices 100 Marks

Working area	Internal Supervisor (50%)	Cooperating School (10%)	External Examiner (40%)	Evaluation Indicator
Experience share as a Learner	10	-	5	Observation Report
Micro Teaching and Peer Teaching	10	-	-	Lesson Plan, Classroom Simulation
Construction of Instructional Materials	5		3	Classroom presentaion digital materials (ppt, video, tutorials, simulation, and soon)
Peer Observation and tis report	5		2	At least 3 peer observation form
Test Construction, Administration, analysis and interpretation	5	5	5	Report of test conduction
The overall report of teaching practice	5		5	Report of on-campus to real-school teaching
Experience as full-teacher in school	10	5	20	Lesson plan, Teaching aids, Classroom performance, Report on feedback to peers, Test construction, administration and analysis of test results
Total	50	10	40	

Note: Students' performance in all headings mentioned in above table should be evaluated addressing practical activities as well as their respective report. Detailed evaluation forms will be developed for evaluating the performance of the students in two different parts. Office of the controller of examination, FOE Dean office assign the external examiner for the evaluation process.

6 Recommended Books and Reading Materials

American Psychological Association.(2009). *Publication manual of American Psychological Asssociation.* (6th ed.). Washington DC: APA.

Baharain Teachers College. (2008). Teaching practice: Student teacher handbook. Baharain: Baharain University http://www.btc.uob.edu.bh/UltimateEditorInclude/UserFiles/StuTeach%20TP1.pdf (Retrieved 8/23/2015)

Cohen, L., Menion, L., & Morrioson, K. (2010). *Teaching practice*. India: Routledge.

School of Education. (2013). *Teaching practice handbook.* Cape Town: University of Cape Town

The Open University (Posted in 27th August 2015). *Learning to teach: Becoming a reflective practitioner.* http://www.open.edu/openlearn/education/learning-teach-becoming-reflective-practitioner/content-section-2.1

Course Title: **Artificial Intelligence in Education**
Course Code: ICT. Ed. 484
Level: Bachelor
Semester: Eighth

Program: **BICTE**
Nature of Course: Theory + Practical
Credit Hours: 3 (2 + 1)
Teaching Hours: 64 (32 Th + 32 Pr)

1. Course Description

This course provides an introduction to Artificial Intelligence (AI) concepts and their applications in education. Students will explore key AI techniques such as search algorithms, knowledge representation, reasoning, machine learning, and natural language processing (NLP) while focusing on practical applications for educational systems.

2. General Objectives

The general objectives of this course are as follows:

- Understand fundamental AI concepts and their relevance to education.
- Explore AI techniques such as search, reasoning, and planning in the context of educational problem-solving.
- Apply machine learning and NLP methods in educational scenarios.
- Analyze the role of AI in adaptive learning and intelligent tutoring systems.
- Discuss ethical issues and emerging trends in AI for education.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Understand the basics of AI and its applications in education. • Explore the historical development of AI. • Evaluate the effectiveness of AI applications in education. • Examine the use of learning agents in Education	**Unit 1: Introduction to AI (3 Hours)** 1.1 Definition and evolution of AI 1.2 Applications of AI in education (adaptive learning, virtual tutors, etc.) 1.3 Importance of knowledge and learning agents in educational AI **Practical Works (3 Hours)** • **Case Study Analysis**: Assign students to analyze real-world case studies of AI applications in education. They could explore platforms like Duolingo (adaptive learning) or IBM Watson Tutor and prepare a report on their AI-driven features and effectiveness.
• Implement and compare different search strategies	**Unit 2: Search Techniques (4 Hours)** 2.1 Uninformed Search Techniques

• Understand the basic principles of uninformed search algorithms. • Understand the role of heuristics in search algorithms. • Understand the principles of adversarial search.	2.1.1 Depth-first search, breadth-first search, depth-limited search, iterative deepening search 2.2 Heuristic Search Techniques 2.2.1 A* search, greedy best-first search, hill climbing 2.3 Adversarial Search 2.3.1 Minimax algorithm and alpha-beta pruning **Practical Works (4 Hours)** • Implement a basic search algorithm to solve a real-world educational problem. For example: Implement DFS or BFS to search for books in the library catalog, helping to locate and retrieve books efficiently.
• Define propositional and predicate logic • Learn the components of logical expressions • Learn how rule-based systems represent knowledge as a set of rules and use inference mechanisms to make decisions or recommendations. • Understand statistical reasoning and its applications. • Develop automated grading systems	**Unit 3: Knowledge Representation and Reasoning (5 Hours)** 3.1 Propositional and Predicate Logic 3.1.1 Syntax, semantics, and inference (forward chaining, backward chaining) 3.2 Rule-based Systems and Statistical Reasoning 3.2.1 Probability, Bayes' theorem, and belief networks 3.3 Applications in Education 3.3.1 Automated grading and lesson planning **Practical Works (5 Hours)** • Implement a simple program to evaluate propositional logic expressions, including truth tables, to check the validity and satisfiability of logical statements. • Build a basic expert system for educational purposes, such as a career counseling system that suggests potential career paths based on student inputs (grades, interests, etc.). Use simple if-then rules to simulate expert advice. • Create a simple automated grading system that uses logical rules to grade multiple-choice or short-answer questions. Extend it to include probabilistic reasoning for handling uncertain or partial answers.
• Define machine learning and understand its significance in AI.	**Unit 4: Machine Learning and Neural Networks (6 Hours)** 4.1 Overview of Machine Learning

• Compare and contrast different learning paradigms. • Understand the structure and components of neural networks. • Apply neural networks to educational problems.	4.1.1 Supervised, unsupervised, and reinforcement learning 4.2 Basics of Neural Networks 4.2.1 Architecture, training, and applications in education 4.3 Applications 4.3.1 Predicting student performance, learning analytics **Practical Works (6 Hours)** • Develop a simple machine learning model using Python libraries like Scikit-learn. • Implement a simple supervised learning model (like linear regression or decision trees) to predict student grades based on features such as attendance, homework scores, and previous test scores. • Develop a machine learning model to predict student performance in upcoming exams based on historical performance data, demographics, and engagement metrics.
• Explain the NLP. • Develop NLP applications to solve Educational problems.	**Unit 5: Natural Language Processing and Applications (4 Hours)** 5.1 Overview of NLP 5.1.1 Parsing, text classification, and sentiment analysis 5.2 Applications in Education 5.2.1 Chat-bots, automated grading, and virtual assistants **Practical Works (4 Hours)** • Create a basic chatbot for answering educational queries using Python's NLTK or Hugging Face.
• Discuss ethical implications and future trends in AI for education. • Understand the role of Generative AI in education. • Examine the ethical implications of emerging AI technologies.	**Unit 6: Ethical Considerations and Emerging Trends in AI (2 Hours)** 6.1 Ethical considerations: Bias, Privacy, and Equity in AI systems **6.2** Emerging trends: Generative AI, Adaptive Learning Platforms, and Augmented Reality **Practical Works (2 Hours)** • Use a generative AI model (like GPT or DALL·E) to create educational content, such as quizzes, lesson plans, or visual aids. Evaluate the

	quality and relevance of the generated content in a real educational context.

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, hands-on labs, project-based learning and flipped classrooms.

4.2 Specific Instructional Techniques

Unit	Activity and Instructional Techniques (48 Hours)
1 to 6	• Organize coding labs where students can implement AI algorithms in languages like Python or tools like TensorFlow, PyTorch, or Scikit-learn. • Use Jupyter Notebooks for data analysis, visualizations, and model development, enabling students to work through real-world datasets. • Assign machine learning projects that require students to train AI models (e.g., predicting student performance, automating grading systems). • Include AI development tools for building neural networks or other machine learning models that can be directly applied to educational contexts (e.g., adaptive learning platforms). • Demonstrate various AI-based educational tools (e.g., virtual tutors, adaptive learning systems) and show how they work in a real classroom setting. • Encourage students to showcase their AI projects (e.g., predictive models, AI-based content creation) in a demo day format, allowing them to present their work to peers and instructors.

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.*

5.1 Evaluation for Part I (Theory): Internal Evaluation 40%

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

1) Attendance 5 Marks

2)	Participation in Learning Activities	5 Marks
3)	First Assessment (Written Assignment)	10 Marks
4)	Second Assessment (Term Examination)	10 Marks
5)	Third Assessment (Internal Practical Exam/Case Study)	10 Marks
	Total	40 Marks

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 Questions) 10× 1 = 10 Marks
2) Short Answer Questions (6 Questions with 2 Or) 6× 5 = 30 Marks

Total	40 Marks

5.3 Evaluation for Part II (practical) 20%

Nature of the Course	Semester Final Examination by External Examiner	Total Percent
Practical	100%	100

5.3.1 Practical Examination Evaluation Scheme

a) External Assessment 100%
   i) Lab Report/Project Report 20%
   ii) Laboratory work exam/Case.....40%
   iii) VIVA.....40%

6. Recommended Books and Reading Materials

- Russell, S., & Norvig, P. (2021). *Artificial intelligence: A modern approach* (4th ed.). Pearson
- Holmes, W., Bialik, M., & Fadel, C. (2021). *Artificial intelligence for education: Promise and implications*. Center for Curriculum Redesign.
- Müller, V. C. (Ed.). (2020). *Ethics of artificial intelligence and robotics*. Stanford Encyclopedia of Philosophy.
- Holmes, W., Bialik, M., & Fadel, C. (2019). *AI in education: Challenges and opportunities*. Center for Curriculum Redesign.

- Shukla, N. (2019). *Deep learning for education*. Springer.
- Ng, A. (2018). *Machine learning yearning*. Deeplearning.ai.
- Goldman, R., Anderson, R. C., & Sullivan, P. S. (Eds.). (1999). *Artificial intelligence in education: Promises and implications for teaching and learning*. Springer.

Course Title: **System Administration using Linux**
Course Code: ICT. Ed. 486
Level: Bachelor
Semester: Eighth

Program: **BICTE**
Nature of Course: Theory + Practical
Credit Hours: 3 (2 +1)
Teaching Hours: 48 (32 Th+ 32 Pr)

1. Course Description

This course provides students with the skills to install, configure, and troubleshoot computer networks and system administration using Linux. The course covers server/client installation and configuration, IP, DHCP, Name Server, DNS, Web server, file, print, and mail server configuration and troubleshooting.

2. General Objectives

The general objectives of this course are:

- To provide knowledge in system administration and computer networks, including components, features, and architecture.
- To explore network standards, protocols, and access methods for network system implementation.
- To develop skills in the installation, configuration, and management of network services.
- To describe actions for enforcing network-level security.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Understand the foundational principles and advantages of open-source software and its role in modern computing. • Gain proficiency in navigating Unix and Linux systems, including command syntax, file management, and shell commands. • Develop skills in text processing and job control for efficient system administration and task automation. • Learn filesystem concepts and package management to effectively manage system resources and software installations.	**Unit 1: Introduction to Linux and CLI Commands (5 Hours)** 1.1 Introduction to Open-Source Software 1.2 Unix System Architecture, Linux Differences, Using a Linux System, Command Syntax 1.3 File Management 1.4 Shell Commands 1.5 Text Processing 1.6 Job Control 1.7 Filesystem Concepts 1.8 Package Management **Practical Works (5 Hours)** • Create and manage files and directories using CLI commands. • Practice text processing with commands like grep, awk, sed. • Manage processes using ps, top, and job control commands.

• Perform Linux installation, manage the boot sequence, and configure kernel and boot loaders. • Manage user accounts, groups, password policies, and authentication settings. • Configure file permissions and access control lists for secure resource management.	**Unit 2: Installation, Boot Process and User Administration (5 Hours)** 2.1 Linux Installation, Network-Based Installation, Boot Sequence, Kernel Initialization, Boot Loaders, Kernel Modules 2.2 User Account Management, Group Administration, Password Policies, Authentication Configuration, File Permissions, Access Control Lists **Practical Works (5 Hours)** • Install Linux on a virtual machine and configure boot loader settings. • Create, modify, and delete user accounts and groups. • Set file and directory permissions and configure ACLs.
• Configure and manage disk quotas to control user storage usage. • Implement RAID levels for data redundancy and performance optimization. • Create and manage logical volumes for flexible storage allocation. • Configure and manage IPv4 and IPv6 addressing and routing. • Diagnose and resolve network connectivity issues using troubleshooting tools.	**Unit 3: Disk Quotas, Storage Management, and Network Configuration (5 Hours)** 3.1 Quotas, RAID Implementation, Logical Volumes, Disk and Inode limits. 3.2 IPv4 and IPv6 Addresses, IP Configuration, Network Troubleshooting **Practical Works (5 Hours)** • Configure and manage disk quotas for users. • Implement RAID 1 using mdadm. • Configure static and dynamic IP addresses and troubleshoot network connectivity.
• Configure DNS and DHCP servers • Demonstrate hostname resolution • Set up and manage FTP, NFS, and Samba servers • Apply best practices for secure file sharing and directory access.	**Unit 4: Network Services and File Sharing (5 Hours)** 4.1 DNS and DHCP Configuration, Hostname Resolution, DNS Queries, Implementing Servers 4.2 FTP, NFS, Samba Server Configuration, Directory Access **Practical Works (5 Hours)** • Configure a DNS server and resolve domain names. • Set up and manage a DHCP server. • Configure and share directories using Samba and NFS.
• Configure Apache, MySQL, Postfix, and Dovecot for seamless operations.	**Unit 5: Web, Email, Database Services, and Network Security (4 Hours)** 5.1 Apache, HTTPD, Email Operations (SMTP, Postfix, Dovecot) 5.2 MySQL Administration.

• Troubleshoot and resolve issues in servers and networks. • Secure systems using SSL/TLS, SSH, and firewalls. • Implement ACLs and anti-spam measures for security.	5.3 Cryptography, SSH, Firewall Configuration, ACLs **Practical Works (4 Hours)** • Set up a basic Apache web server and host a sample website. • Configure an email server using Postfix and Dovecot. • Secure a Linux server using SSH keys, configure a firewall with iptables or firewall.

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 particular units.

4.1 General Techniques

Reading materials will be provided to students in each unit. Lecture, Discussion, use of multi-media projector, 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 Evaluation

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

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

5.1 Internal Evaluation (40 %):

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 Question (Multiple Choice Questions)	(10 × 1) = 10 Marks
2)	Subjective Answer Questions (6 Questions with 2 Or)	(6× 5) = 30 Marks
	Total	40 Marks

5.3 **External Practical Exam/Viva (20 Marks):**

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

6 Recommended Books and Reading Materials

- Negus, C. (2020). *Linux Bible* (10th ed.). Wiley.
- Negus, C. (2025). *Linux Bible* (11th ed.). Wiley.
- Nemeth, E., Snyder, G., Hein, T. R., Whaley, B., & Mackin, D. (2021). *UNIX and Linux system administration handbook* (5th ed.). Addison-Wesley.
- Fox, R. (2021). Linux with Operating System Concepts (2nd ed.). CRC Press.
- Wale Soyinka, W. (2020). Linux Administration: A Beginners Guide (8th ed.). McGraw Hill.
- Limoncelli, T. A., Hogan, C. J., & Chalup, S. R. (2017). *The practice of system and network administration* (3rd ed.). Addison-Wesley.
- Rankin, K., & Hill, B. M. (2013). The official Ubuntu server book (3rd ed.). Pearson.
- Smith, R.W. (2002). Advanced Linux Networking (1st ed.). Addison-Wesley Professional.
- Frisch, Æ. (2002), Essential System Administration: Tools and Techniques for Linux and Unix Administration, 3rd Edition, O'Reilly

Course Title: **Cloud Computing**
Course Code: ICT. Ed. 488 (Elective II)
Level: Bachelor
Semester: Eighth

Program: **BICTE**
Nature of Course: Theory + Practical
Credit Hours: 3 (2 + 1)
Teaching Hours: 64 (32 Th +32 Pr)

1. Course Description

This course introduces undergraduate students to the foundational concepts, architecture, and practical applications of cloud computing. Students will explore the different cloud service models (IaaS, PaaS, SaaS) and deployment strategies (public, private, hybrid, and community clouds). The course provides hands-on experience with industry-leading cloud platforms such as Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP).

Students will apply their knowledge to design and deploy scalable, cloud-based solutions, preparing them for careers in cloud computing and related fields. By the end of the course, students will gain the technical and practical skills necessary to leverage cloud technologies effectively in real-world scenarios.

2. General Objectives

The general objectives of this course are as follows:

- Develop an understanding of the fundamental concepts of cloud computing.
- Gain familiarity with cloud service models and deployment strategies.
- Learn to design and deploy basic cloud-based applications.
- Develop an understanding of security and compliance in the cloud.
- Acquire practical experience with leading cloud platforms

3. Specific Objectives and Contents

Specific Objectives	Contents
• Explain the concept of Cloud Computing with characteristics. • Understand the basic terminologies related to cloud and traditional IT infrastructure. • Identify major cloud service providers	**Unit 1: Introduction (4 Hours)** 1.1 History and Evolution of Cloud Computing 1.2 Characteristics of Cloud Computing 1.3 Cloud vs Traditional IT Infrastructure 1.4 Major Cloud Service Providers Overview **Practical Works (4 Hours)** • Compare the services, pricing, and user interfaces offered by different providers. • Analyze a case study where an organization transitioned from traditional IT infrastructure to the cloud, and present the benefits and challenges faced.

• Explain different cloud services model • Compare and contrast different deployment models • Understand the role of virtualization in cloud	**Unit 2: Cloud Computing Architecture (5 Hours)** 2.1 Cloud Service Models: 2.1.1 Infrastructure as a Service (IaaS) 2.1.2 Platform as a Service (PaaS) 2.1.3 Software as a Service (SaaS) 2.2 Deployment Models: 2.2.1 Public, Private, Hybrid, and Community Clouds 2.3 Virtualization and its Role in Cloud Computing **Practical Works (4 Hours)** • Use a PaaS provider (e.g., AWS Elastic Beanstalk, Azure App Service, or Google App Engine) to deploy a simple application, such as a "Hello World" web app. • Sign up for a SaaS application (e.g., Google Workspace, Microsoft 365, or Salesforce) then explore and document its features, benefits, and limitations.
• Explain different cloud platforms. • Apply different cloud tools for computation, storage and data management.	**Unit 3: Cloud Platforms and Tools (5 Hours)** 3.1 Introduction to AWS, Microsoft Azure, and Google Cloud Platform (GCP) 3.2 Overview of cloud tools 3.2.1 Compute 3.2.2 Storage 3.2.3 Database **Practical Works (6 Hours)** • Guide students through the process of setting up a free-tier account for AWS, Azure, and GCP. Ask students to document the steps involved in setting up the free-tier account for each provider, including limitations (e.g., compute hours, storage, or data transfer limits). • Set up cloud storage on AWS (S3), Azure (Blob Storage), and GCP (Cloud Storage) then upload a file (e.g., a text document or image) to each platform and access it through a browser or API. • Perform a basic SQL query (e.g., SELECT, INSERT) on each cloud provider's database service.
• Develop cloud native application.	**Unit 4: Application Development in the Cloud (3 Hours)** 4.1 Basics of Cloud-native Development

• Explain containers and automate container deployment using Kubernetes.	4.2 Introduction to Containers and Kubernetes **Practical Works (6 Hours)** • Develop a simple cloud-native application using a microservices architecture. Implement basic services (e.g., a user service, a product service) that communicate over REST APIs or gRPC. Use a cloud provider (AWS, Azure, or GCP) to host these services, demonstrating key cloud-native principles like scalability and resilience. • Set up a local Kubernetes environment using tools like **Minikube** or **K3s**. Deploy a multi-container application (e.g., front-end and back-end services) to Kubernetes and expose the application through a LoadBalancer or Service.
• Explain the different security challenges in Cloud. • Implement IAM. • Know different compliance standards. • Know pricing models in Cloud Services.	**Unit 5: Cloud Security, Compliance, and Pricing (4 Hours)** 5.1 Security Challenges in Cloud Computing 5.2 Identity and Access Management (IAM) 5.3 Encryption and Data Privacy 5.4 Compliance Standards 5.5 Pricing Models in Cloud Computing **Practical Works (4 Hours)** • Set up security configurations on a cloud platform (e.g., AWS, Azure, or GCP) to demonstrate protections such as: Configuring firewalls or security groups to control network traffic. • Implement IAM in a cloud platform (e.g., AWS IAM, Azure AD, or GCP IAM). Create and assign different roles and permissions to users (e.g., admin, developer, read-only) for accessing specific resources.
• Define Edge computing and serverless architecture • Identify the application of AI and Big Data in Cloud	**Unit 6: Emerging Trends in Cloud Computing (3 Hours)** 6.1 Edge Computing and Serverless Architectures **6.2** Artificial Intelligence (AI) and Big Data in the Cloud

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, hands-on labs, project based learning and flipped classrooms.

4.2 Specific Instructional Techniques

Unit	Activity and Instructional Techniques (48 Hours)
1 to 6	Use Interactive cloud platforms and simulations can be used

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.*

5.1 Evaluation for Part I (Theory): Internal Evaluation 40%

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

1) Attendance	5 Marks
2) Participation in Learning Activities	5 Marks
3) First assessment (Written Assignment)	10 Marks
4) Second assessment (Term Examination)	10 Marks
5) Third assessment (Internal Practical Exam/Case Study)	10 Marks
Total	40 Marks

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 Questions)	(10 × 1) = 10 Marks
2) Short Answer Questions (6 Questions with 2 Or)	(6× 5) = 30 Marks
Total	40 Marks

5.3 Evaluation for Part II (Practical) 20%

Nature of the Course	Semester Final Examination by External Examiner	Total percent
Practical	100%	100

5.3.1 Practical Examination Evaluation Scheme

a) External assessment 100%
   i) Lab Report/Project Report 20%
   ii) Laboratory Work Exam/Case.....40%
   iii) VIVA.....40%

6. Recommended Books and Reading Materials

- Erl, T. & Monroy, E. (2023). *Cloud Computing: Concepts, Technology, Security and Architecture, 2nd Edition.* Pearson Education
- Hurwitz, J.S. & Kirsch, D. (2020). *Cloud Computing For Dummies, 2nd Edition,* John Wiley and Sons Inc.
- Hoff, T. (2017). *Explain the Cloud Like I'm 10, 1st Edition,* Possibility Outpost Inc.
- Marinescu, D.C. (2022). *Cloud Computing Theory and Practice, 3rd Edition*, Morgan Kaufmann
- Linthicum, D. (2023). *Insider's Guide to Cloud Computing, 1st Edition*, Pearson Education

Course Title: **Big Data and Data Analysis**
Course Code: ICT. Ed. 489 (Elective II)
Level: Bachelor
Semester: Eighth

Program: **BICTE**
Nature of Course: Theory + Practical
Credit Hours: 3 (2 + 1)
Teaching Hours: 64 (32 Th +32 Pr)

1. Course Description

This course provides an extensive overview of big data topics, tools, and methodologies. Students will examine the features and uses of big data, acquire foundational knowledge of Hadoop and its ecosystem, and obtain practical experience in data visualization via Power BI. The course includes data pretreatment methodologies and data analysis with Python modules such as NumPy, Pandas, and PySpark. Practical exercises will consolidate theoretical understanding and generate real-world experience in large data analysis and visualization.

2. General Objectives

The general objectives of this course are as follows:

- Explain the definition and attributes of big data, including volume, velocity, diversity, truth, and value.
- Examine the utilization of big data within the educational framework by comparing big data with conventional data methodologies.
- Discuss the Hadoop ecosystem, encompassing HDFS, MapReduce, YARN, and Hadoop applications such as Hive, Spark, Sqoop, and Pig.
- Integrate Power BI with diverse data sources to develop dynamic dashboards and reports.
- Prepare and modify data for extensive data analysis, encompassing the management of absent and inconsistent data.
- Conduct data analysis utilizing Python libraries (NumPy, Pandas, PySpark) and show data findings.

3. Specific Objectives and Contents

Specific Objectives	Contents
• Define the key characteristics of big data. • Analyze the applications of big data in the education system. • Compare big data with traditional data to highlight their differences and advantages.	**Unit 1: Concept of Big Data (4 Hours)** 1.1 Definition and Characteristics (Volume, Velocity, Variety, Veracity, Value) 1.2 Applications in Education System 1.3 Big Data vs. Traditional Data 1.4 Recent Trends in Big Data and Practices in Education system
• Describe the components of the Hadoop ecosystem. • Explain the functionality of the Hadoop Distributed File System (HDFS).	**Unit 2: Basic Concepts of Hadoop (8 Hours)** 2.1 Hadoop Ecosystem Overview 2.2 Hadoop Distributed File System (HDFS) 2.3 MapReduce Framework 2.4 Hadoop YARN

• Implement a simple MapReduce program. • Explore resource management using Hadoop YARN. • Utilize Hadoop applications such as Hive, Spark, Sqoop, and Pig for data processing tasks.	2.5 Concept of Hadoop Applications: Hive, Spark, Sqoop, Pig **Practical Works (8 Hours)** • Install and configure Hadoop on a local machine. • Perform basic HDFS operations (upload, download, delete files). • Write and execute a simple MapReduce program. • Explore Hadoop YARN resource management.
• Identify the components and features of Power BI. • Connect Power BI to various data sources. • Transform and model data within Power BI. • Create interactive visualizations and dashboards. • Collaborate and share reports using Power BI.	**Unit 3: Data Visualization with Power BI (6 Hours)** 3.1 Power BI Overview and Components 3.2 Connecting to Data Sources 3.3 Data Transformation and Modeling 3.4 Creating Visualizations 3.5 Sharing and Collaborating with Power BI **Practical Works (6 Hours)** • Connect Power BI to various data sources. • Transform and model data in Power BI. • Create interactive dashboards and reports. • Share reports and collaborate with team members.
• Define the importance of data cleaning in big data analytics. • Recognize the impact of missing and inconsistent data on analysis results. • Explain the ETL process and its role in data integration. • Describe principles of data integration and aggregation. • Define the need for data reduction in big data analytics.	**Unit 4: Data Preprocessing for Big Data (6 Hours)** 4.1 Data Cleaning and Transformation 4.2 Handling Missing and Inconsistent Data 4.3 Introduction to ETL (Extract, Transform, Load) Processes 4.4 Concept of Data Integration and Aggregation 4.5 Data Reduction and Feature Selection
• Define the basic concepts and importance of data analysis and visualization in various fields. • Setup the key Python libraries (NumPy, Pandas, Matplotlib) and describe their roles in big data analysis.	**Unit 5: Data Analysis Using Python Libraries (8 Hours)** 5.1 Introduction to Data Analysis and Visualization 5.2 Concept of python library and bigdata analysis environment 5.3 NumPy and Statistical functions 5.4 Pandas for Data Handling 5.5 Matplotlib for Data Visualization 5.6 Data Ingestion and Exploration in python **Practical Works (8 Hours)**

• Apply NumPy to create arrays and perform statistical functions such as mean, median, and standard deviation. • Clean and preprocess data using Pandas, including handling missing values and data aggregation. • Create and customize various types of plots (line, bar, scatter) using Matplotlib to visualize data effectively. • Load and explore large datasets from various sources (e.g., CSV, JSON) to gain insights and prepare for analysis.	• Installing and configuring Python and essential libraries (e.g., NumPy, Pandas, PySpark). • Create a NumPy array and perform basic operations (addition, subtraction, mean, standard deviation). • Load a dataset into a Pandas DataFrame, clean the data, and handle missing values. • Perform data aggregation and grouping on a Pandas DataFrame. • Create a line plot and a bar chart using Matplotlib with customized labels and titles. • Loading large datasets from various sources (e.g., CSV, JSON, databases).
• Define the basic concepts of big data and the role of PySpark in big data analysis. • Install and configure PySpark to set up the big data analysis environment. • Create and manipulate PySpark DataFrames for data analysis. • Perform large-scale data analysis using PySpark to gain insights. • Query data using Spark SQL to extract meaningful information from PySpark DataFrames. • Create interactive visualizations and generate reports to summarize data insights.	**Unit 6: Big Data Analysis Using Python Libraries (6 Hours)** 6.1 Introduction to Big Data and PySpark 6.2 Installing and configuring PySpark 6.3 PySpark DataFrames 6.4 Big Data Analysis with PySpark 6.5 Using SQL (DBMS tools) for querying data 6.6 Data Visualization and Reporting 6.7 Concept of Spark SQL and its appliction **Practical Works (8 Hours)** • Set up a PySpark environment and create a simple PySpark application. • Load a large dataset into a PySpark DataFrame and perform basic operations (filtering, grouping). • Handle missing data in a PySpark DataFrame and perform data cleaning. • Use Spark SQL to query a PySpark DataFrame and analyze the results. • Create interactive visualizations and dashboards using Pandas with Matplotlib/Seaborn and PySpark with Plotly. Generate a report summarizing the insights from the visualizations.

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, hands-on labs, project based learning and flipped classrooms.

4.2 Specific Instructional Techniques

Unit	Activity and Instructional Techniques (64 Hours)
1	• Use real-world examples to explain each characteristic of big data (Volume, Velocity, Variety, Veracity, Value) • Discuss case studies where big data has been used to improve educational outcomes. • Highlight the differences in data processing and analysis techniques. • Present current research and developments in big data practices
2	• Provide an overview of HDFS, MapReduce, YARN, and Hadoop applications. • Demonstrate basic HDFS operations (upload, download, delete files). • Write and execute a simple MapReduce program. • Discuss the role of YARN in managing cluster resources. • Provide examples of how each application is used in big data processing.
3	• Introduce the Power BI interface and its main features. • Demonstrate how to connect Power BI to different data sources (e.g., Excel, databases). • Show how to clean and prepare data for analysis in Power BI. • Guide students through creating various visualizations (e.g., charts, graphs). • Explain how to publish and share Power BI reports.
4	• Teach techniques for handling missing and inconsistent data. • Provide strategies for dealing with incomplete data. • Explain the steps involved in extracting, transforming, and loading data. • Discuss methods for combining and summarizing data. • Introduce techniques for data reduction and feature selection.
5	• Provide an overview of data analysis techniques and visualization tools. • Discuss the roles of NumPy, Pandas, and PySpark in data analysis. • Demonstrate how to perform basic operations with NumPy arrays. • Show how to load, clean, and manipulate data in Pandas DataFrames. • Guide students through creating and customizing plots.

	• Teach techniques for loading and exploring large datasets.
6	• Introduce PySpark and its capabilities. • Provide step-by-step instructions for setting up PySpark. • Demonstrate basic operations with PySpark DataFrames • Guide students through analyzing large datasets with PySpark. • Show how to write and execute SQL queries in PySpark. • Teach students how to create interactive visualizations and summarize insights in reports.

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.

5.1 Evaluation for Part I (Theory): Internal Evaluation 40%

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

1) Attendance	5 Marks
2) Participation in Learning Activities	5 Marks
3) First Assessment (Written Assignment)	10 Marks
4) Second Assessment (Term Examination)	10 Marks
5) Third Assessment (Internal Practical Exam/Case Study)	10 Marks
Total	40 Marks

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 Questions)	(10 × 1) = 10 Marks
2) Short Answer Questions (6 Questions with 2 Or)	(6× 5) = 30 Marks
Total	40 Marks

5.3 Evaluation for Part II (Practical) 20%

Nature of the Course	Semester Final Examination by External Examiner	Total Marks
Practical	100%	20

5.3.1 Practical Examination Evaluation Scheme

a) External assessment 100%
   i) Lab Report/Project Report 20%
   ii) Laboratory Work Exam/Case.....40%
   iii) VIVA.....40%

6. Recommended Books and Reading Materials

1. Mayer-Schönberger, V., & Cukier, K. (2014). *Big Data: A Revolution That Will Transform How We Live, Work, and Think.* Houghton Mifflin Harcourt.
2. White, T. (2012). *Hadoop: The Definitive Guide*. O'Reilly Media.
3. Karau, H., & Warren, R. (2020). *Learning Spark: Lightning-Fast Data Analytics*. O'Reilly Media.
4. Knight, D. (2022). *Microsoft Power BI Quick Start Guide*. Packt Publishing.
5. Powell, B. (2024). *Mastering Microsoft Power BI.* Packt Publishing.
6. McKinney, W. (2017). *Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython*. O'Reilly Media.
7. Grus, J. (2019). *Data Science from Scratch: First Principles with Python.* O'Reilly Media.
8. Holmes, D. E. (2017). *Big Data: A Very Short Introduction.* Oxford University Press.
9. Balusamy, B., Abirami, N. R., Kadry, S., & Gandomi, A. (2021). *Big Data: Concepts, Technology, and Architecture*. Wiley.