Programme Report

4-8 May 2026

Outcome-Based Curriculum Development for Computer/Software/IT Engineering Programmes

conducted at
(Pokhara, Nepal)

By

Deemed to be University under Distinct Category

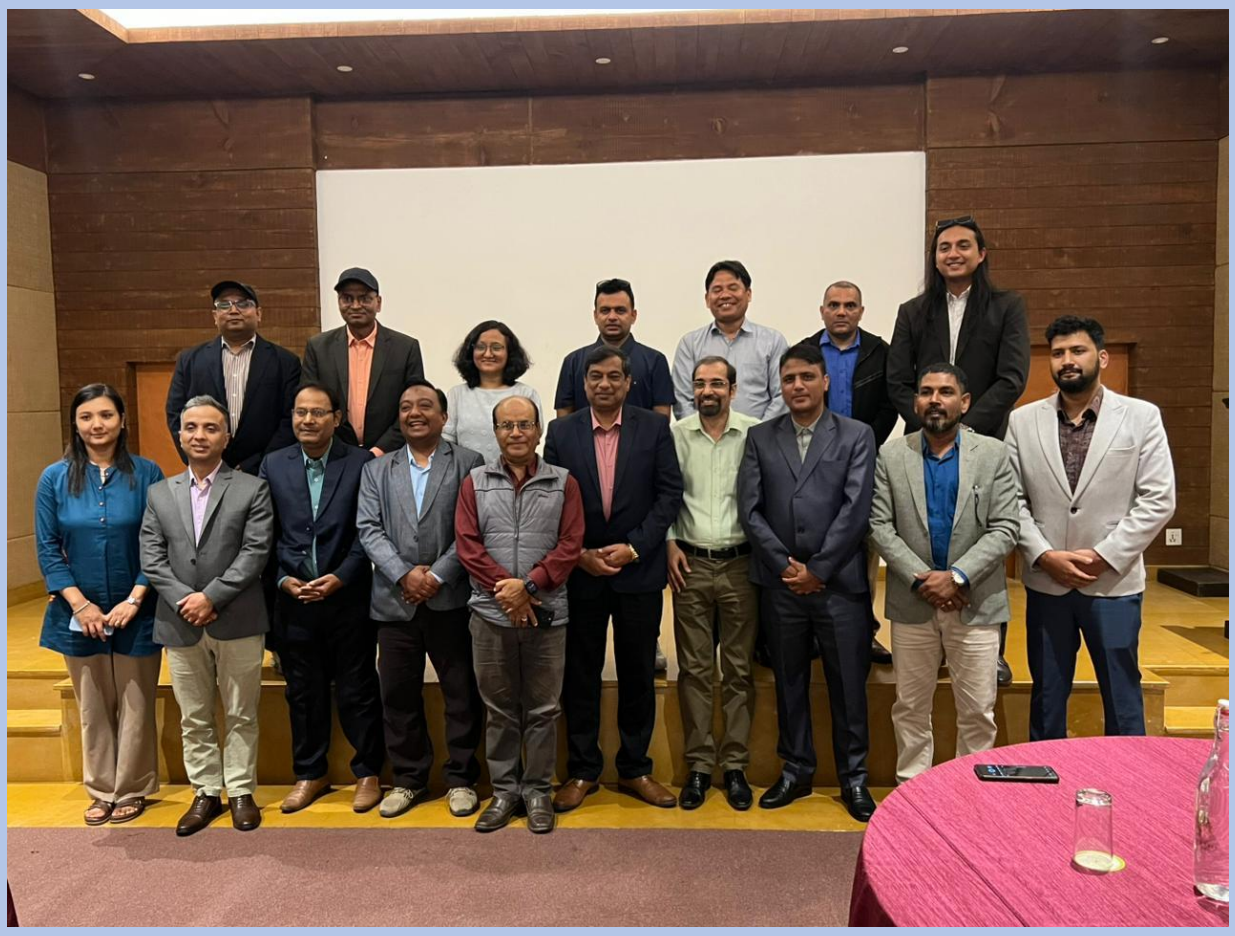
National Institute of Technical Teachers' Training and Research, Bhopal
(Ministry of Education, Government of India)

In Collaboration with

Nepal Engineering Council, Nepal

Coordinator: Dr Sanjay Agrawal, Dean, Academics Affairs, Professor & Head, Department of Computer Science and Engineering, NITTTR, Bhopal
Faculty: Dr R. K. Kapoor, Professor, Department of Computer Science and Engineering, NITTTR, Bhopal

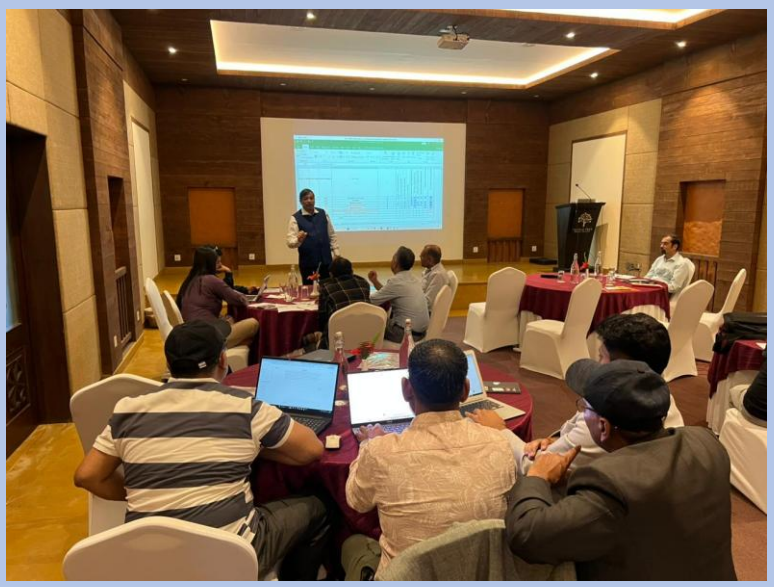

नेपाल इन्जिनियरिङ्ग परिषद्
NEPAL ENGINEERING COUNCIL
INTERNATIONAL ENGINEERING ALLIANCE
Capacity Building Training Program
on
"Outcome-Based Curriculum Development"
BE Computer/Software Engineering Curriculum
May 4 - 8, 2026 (Phase - I)
Pokhara
Organizing Partner
पोखरा विश्वविद्यालय
POKHARA UNIVERSITY




TEMPLE TREE
RESORT AND SPA


Mapping between
Course Outcomes and POs & PSOs:
Course Articulation Matrix
Dr. Sanjay Agrawal
Professor, NITTTR, Bhopal


Course Articulation Matrix: The Central Hub for Mapping Learning to Programe Outcomes
COURSE OUTCOMES
(COs)
COURSE ARTICULATION MATRIX
(The Mapping Hub)
PROGRAMME OUTCOMES
(POs & PSOs)
Course Outcome 1 (CO1)
Course Outcome 2 (CO2)
Course Outcome 3 (CO3)
Course Outcome N (CON)
PO1: Eng. Knowledge
PO2: Problem Analysis
PO3: Design/Development
PO...
PO11
PSO1: Specific Skill 1
PSO2: Specific Skill 2




TEMPLE TREE
RESORT AND SPA


The critical word is DO
DO

Programme Report

Programme Code: NC-CONSNEP-25/26-27

Programme Title: Outcome Based Curriculum Development for IT, Computer/Software Engineering Programmes

Duration: 04 to 08 May 2026

Venue: Pokhare, Nepal

1. Background

The global engineering education landscape is increasingly defined by internationally benchmarked quality frameworks, with **Outcome-Based Education (OBE)** at its core, making Nepal's pursuit of Washington Accord membership under the International Engineering Alliance (IEA) a mandatory driver for curriculum reform. To address this, a formal **Memorandum of Understanding (MOU)** was signed on **March 11, 2026**, between **NITTTR Bhopal** and the **Nepal Engineering Council (NEC)**, initiating a comprehensive capacity-building programme designed to bridge the gap between theoretical OBE principles and their practical implementation. Recognizing that faculty are the primary agents of change, this "Training of Trainers" initiative focuses on equipping educators with the expertise to articulate Outcome Based Curriculum for Undergraduate Engineering Programmes.

This report marks the completion of **Phase 1**, which successfully localized these global standards to the Nepalese context, culminating in the critical redesign of the **BE Computer Engineering/ Software Engineering programme structure** and the finalization of **course curriculum detailing format**. By achieving these deliverables, the program has established a robust foundation for meeting Washington Accord benchmarks, while simultaneously strengthening the Indo-Nepal academic partnership and ensuring that Nepal's engineering education is positioned to achieve credible, internationally recognized standards.

2. Programme Outcomes

As outlined in MOU it is expected that the participants on completion of the programme will be able to:

a) Explain principles of OBE.
b) Interpret graduate attributes/ POs, knowledge and attitude profiles.
c) Develop a programme structure for an identified programme.
d) Formulate course outcomes.
e) Review the format for course curriculum detailing.

The above have been successfully achieved on completion of the programme. (Refer Annexure 3 and Annexure 4). The detailed programme brief, along with the training schedule that was implemented is given in ***Annexure 1***

3. Implementation Methodology: Phase 1

Phase 1 of the programme was strategically designed for in-country delivery to ensure contextual relevance and maximum faculty participation. A total of 19 faculty members from following six universities participated in the programme.

i. Kathmandu University
ii. Purbanchal University

iii. Pokhara University
iv. Mid Western University
v. Tribhuvan University
vi. Far Western University

The programme was conducted at Pokhara, Nepal. The details of participants is given in ***Annexure 2.*** During the training participatory approach was followed that include Input cum discussion, Hands-on Exercises/ Group work, Presentations, and Tasks

4. Key Deliverables Achieved

The Phase 1 intervention was intensive and result-oriented, culminating in two specific technical outputs that will be the foundation of Phase 2 to be conducted at NITTTR, Bhopal India.

A. Redesign of the BE Computer Engineering/ Software Engineering programme structure

The participants successfully mapped the Engineering curriculum against the IEA Graduate Attributes and Programme Outcomes as outlined by Nepal Engineering Council. This involved:

- Identifying existing curriculum gaps
- Reviewing existing course structures.
- Formulating Programme Educational Objectives (PEOs)
- Formulating Programme Specific Outcomes (PSOs)
- Integrating components as mentioned in knowledge and attitude profile into the revised programme structure.

The first draft of the programme structure for the six Universities offering Undergraduate Programme In Computer Engineering/Software Engineering is given in ***Annexure3.*** The unique features of revised programme structure include the following:

This draft program curriculum is designed based on Outcome-Based Education (OBE) philosophy with the following points in mind:

- Courses are designed to be student-centric rather than teacher-centric, while respecting the philosophies of KU and OBE.
- Open electives, and the capstone project are introduced to facilitate interdisciplinary collaboration for solving complex engineering problems.
- Courses having practical and organizational contributions (research and project) are included.
- Priority is given to emerging technologies related and industry demand courses.
- Courses related to humanities and social sciences (such as Health and Mental Well-being, and Buddhist Philosophy) are introduced for students' holistic development.
- Existing courses are updated to make them more suitable for computer engineering.
    - Merged “General Physics I” and “General Physics II” into “Physics for Computing”,
    - Merged “Engineering Drawing I” and “Engineering Drawing II” into “Engineering Drawing and Design Thinking”,

- Changed “Computer Programming” to “Computational Thinking”,
- “Workshop Technology” to “Computer Workshop Technology”,
- “Object-Oriented Programming” to “Programming Language Paradigms”,
- “Introduction to Environmental Engineering” to “Environment, Society and Sustainable Computing”,
- “Communication and Networking” to “Computer Networks”,
- “Computer Graphics” to “Computer Graphics and Game Development”,
- “Operation Research” to “Optimization Theory”,
- “Engineering Management” to “ICT Management”

- Following courses are added: Theory of Computation as per NEC licensing exam, Data Mining and Data Warehousing, and the Concept of Professional Electives is introduced to enhance the skill set in the specific domain of computing.
- Alternative course for Theory of Computation is Cloud Computing.
- Following existing courses are removed: General Chemistry, Elements of Engineering I, Elements of Engineering II, Discrete Mathematics/Structures, Digital Electronics Laboratory Work, Principles of Programming Languages, System Analysis and Design, and Compiler Design.
- Multiple engineering projects are incorporated to facilitate the development of a project addressing the societal needs..

B. Finalization of the Course Curriculum Detailing Format

To ensure uniformity across all Universities, a “Course Detailing Format" aligned to Outcome Based philosophy, was proposed by NITTTR, Bhopal. This was thoroughly discussed and was accepted by all the participants representing various universities. One course detailing was attempted by participants from each university. The outcome of each university is given in ***Annexure 4.***

5. Strategic Significance of Phase 1 Training

This collaboration marks a pivotal step in strengthening the Indo-Nepal academic partnership. By accepting the outcome based curriculum framework and building local faculty capacity, this initiative provides the essential foundation for Nepal’s successful and credible bid for Washington Accord membership.

Phase 1 has successfully transitioned the theoretical mandate of the NEC into a practical, implementable roadmap. The first draft of BE Computer Engineering/ Software Engineering Programme Structure will carried forward into Phase 2 at NITTTR, Bhopal, where faculty will gain exposure to design course curriculum and the rubrics.

राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान, भोपाल

(सम-विश्वविद्यालय-विशिष्ट श्रेणी)

National Institute of Technical Teachers' Training & Research, Bhopal

(Deemed -to -be University under Distinct Category)

Programme Brief

Programme Code: NC-CONSNEP-25

Programme Title: Outcome Based Curriculum Development for IT, Computer/Software Engineering Programmes"

Duration: 04 to 08 May 2026

Venue: Pokhara University, Pokhara, Nepal

1. Rationale:

The global engineering education landscape is increasingly governed by internationally benchmarked quality frameworks, with Outcome-Based Education (OBE) at their core. Nepal's pursuit of Washington Accord membership under the International Engineering Alliance (IEA) has made the adoption of OBE not just desirable but mandatory.

In this view, as per the Memorandum of Understanding (MOU) between NITTTR, Bhopal, Deemed to be University under Distinct Category (Ministry of Education, Government of India) and the Nepal Engineering Council (NEC) signed on 11/03/2026, Capacity building Programmes on "*Outcome-Based Curriculum Development for the engineering faculty of Nepal" are planned to* be conducted.

The Washington Accord requires that member institutions demonstrate measurable graduate competencies aligned with global engineering standards. Engineering colleges under the Nepal Engineering Council (NEC) must therefore redesign their curricula in conformity with OBE principles. This transformation involves articulating Programme Educational Objectives (PEOs), Programme Outcomes (POs), and Course Outcomes (COs). However, such reform cannot succeed without first building the capacity of faculty, who are the primary implementers of any curriculum change. Recognising this gap, NITTTR Bhopal — a premier institution under the Ministry of Education, Government of India, has been entrusted to undertake the task of Training of Trainers for faculty of Nepal.

NITTTR Bhopal brings decades of expertise in technical teacher training, curriculum development, and academic quality assurance to this assignment. The proposed series of training programmes is designed to bridge the knowledge and skill gap among faculty regarding OBE concepts and their practical application in curriculum design. It will also cover constructive alignment, outcome formulation, OBE-driven pedagogy, and outcome-based assessment strategies.

The proposed training initiative will be delivered in two phases, each of five days' duration. The first phase will comprise four programmes to be conducted at different locations across Nepal, while the second phase will host four programmes at NITTTR, Bhopal. NEC, Nepal, will identify and depute faculty members from various disciplines of engineering colleges to participate as trainees. This two-phase structure is deliberately designed to ensure both contextual relevance through in-country delivery and international

academic exposure through the India-based component, thereby maximising the overall learning impact of the training initiative.

At the end of the training programmes, the participants will be able to redesign existing course curricula to meet Washington Accord benchmarks. The programme is structured to be intensive yet practical, ensuring faculty are updated with ready-to-implement curriculum reform aspects. This collaboration between NITTTR Bhopal and NEC, Nepal, represents a significant step in strengthening Indo-Nepal academic partnerships. It reflects a shared commitment to elevate engineering education quality in Nepal to internationally recognised standards. This training initiative will serve as the foundation for Nepal's credible and successful bid for Washington Accord membership.

Phase 1 of Training:

This Capacity Development Programme on "Outcome-Based Curriculum Development" Phase 1 aims to equip faculty with the knowledge and skills needed to design curriculum structures that integrate the principles and practices of outcome-based education, in alignment with IEA standards.

2. Programme Outcomes:

a) Explain principles of OBE.
b) Interpret graduate attributes/ POs, knowledge and attitude profiles.
c) Develop a programme structure for an identified programme.
d) Formulate course outcomes.
e) Review the format for course curriculum detailing.

3. Programme Contents

- Concepts and principles of Outcome-Based Education (OBE).
- Three pillars of OBE: Outcome-Based Curriculum, Outcome-Based Teaching and Learning, Outcome-Based Assessment.
- Graduate Attributes, introduction to GAPC, Knowledge and Attitude profile.
- Domains of learning.
- Outcome-Based Curriculum Development approach.
- Components of Outcome-Based Curriculum.
- Writing course outcomes.
- Draft Course Curriculum format.

4. Instructional Strategy:

- Input cum discussion
- Hands-on Exercises/ Group work
- Presentations, Assignments, Tasks

5. **Target Group:** Faculty members of IT/Computer/Software Engineering from different universities of Nepal.

6. Coordinator & Faculty details:

a. Dr. Sanjay Agrawal, Professor, Dean of Academic Affairs, and Head DCSE, NITTTR Bhopal
Tel. No. (O): + 91 (755) 2661600 – 02 Extn. 406
Mobile No: 9425004434
E-mail ID: sagrawal@nitttrbpl.ac.in

b. Dr. R.K. Kapoor, Professor, DCSE, NITTTR Bhopal
Tel. No. (O): + 91 (755) 2661600 – 02 Extn. 331
Mobile No: 9425011468
E-mail ID: rkkapoor@nitttrbpl.ac.in

7. Tentative Schedule:

Date	Session I (10.00 AM to 11.15 AM)	Session II (11.45 AM to 01.00 PM)	Session III (02.00 PM to 03.15 PM)	Session IV (03.45 PM to 05.00 PM)
Day-1	• Registration • Inaugural Session • Introduction to Programme Brief	• Concepts and Principles of OBE • OBC, OBTL and OBA Frameworks • Architecture of OBE	• Introduction to GAPC and International Accords • Programme outcomes/ Graduate Attributes for Engineers	Knowledge and Attitude Profiles in OBE
Day-2	Domains of Learning	Outcome-Based Curriculum Development Approach	**Task-1:** Identify Existing Curriculum Gaps	• Programme Structure • Components of an Outcome-Based Curriculum
Day-3	**Task-2:** Develop Programme Structure for the identified Programme	Continued	Presentation and feedback on Draft Programme Structure	Sample Course Detailing Format
Day-4	Course Outcomes	**Task-3:** Formulate COs and create CAM for the selected Course(s)	Continued	Presentation and feedback of COs
Day-5	• Review and finalise the course curriculum format • Develop draft course curriculum for sample course(s)		Presentation and Feedback	Valedictory and Phase 1 Wrap-up

National Institute of Technical Teachers' Training and Research
Shamla Hills, Bhopal-462002

Outcome-Based Curriculum Development for Computer/Software/IT Engineering Programmes

(04 May 2026 to 08 May 2026, Pokhara University, Nepal)

List of Participants

Sr.No.	Name of the Participant	Designation	E-Mail	Phone Number	Institute Name
1.	Kunjan Amatya	Associate Professor	amatya.kunjan@gmail.com	9841434939	Kathmandu Engineering College
2.	Birodh Rijal	Associate Professor	Birodh.rijal@gmail.com	9849024245	Far Western University, Nepal
3.	Nirdosh Adhikari	Assistant Professor	nirdosh@ncit.edu.np	9808871693	Nepal College of Information Technology
4.	Subarna Shakya	Professor	subarna40@gmail.com	9851032303	Tribhuvan University, Nepal
5.	Bilip Bir Paudel	Assistant Professor	bilievexpaudel@gmail.com	9864734418	Mid-Western University
6.	Bharat Keshar Khanal	Assistant Professor	bharatkhanal119@gmail.com	9868931623	Mid-Western University
7.	Jayaraj Joshi	Senior Lecturer	Jayarajjoshi5093@gmail.com	9868415093	Himalayan Whitehouse International College
8.	Ram Govind Aryal	Associate Professor	aryal.rg@gmail.com	9841409997	Cosmos College of Management and Technology

Sr.No.	Name of the Participant	Designation	E-Mail	Phone Number	Institute Name
9.	Nitin Bhagat	Associate Professor	bhagatnitin312@gmail.com	9842122666	Purbanchal University
10.	Dhiraj Shrestha	Assistant Professor	dhiraj@ku.edu.np	9840052596	Kathmandu University
11.	Gajendra Sharma	Professor	gajednra.sharma@ku.edu.np	9840093887	Kathmandu University
12.	Pankaj Raj Dawadi	Associate Professor	pdawadi@ku.edu.np	9843343484	Kathmandu University
13.	Santosh Sah	Assistant Lecturer	sah.santosh@gmail.com	9851125911	Purbanchal University
14.	Shiva Prasad Mahato	Senior Lecturer	spmmahato@gmail.com	9841402187	Khwopa Engineering College
15.	Sushant Paudel	Assistant Professor	sushant.paudel@pu.edu.np	9802853003	Pokhara University
16.	Bikash Bhattarai	Assistant Professor	hellobecks123@gmail.com	9843368914	Pokhara University
17.	Shraddha KC	Assistant Professor	Kcshraddha2015@gmail.com	9868145000	Pokhara University
18.	Rajani Chulyadyo	Assistant Professor	rajani.chulyadyo@ku.edu.np	9803293409	Kathmandu University
19.	Rajendra Raut	Assistant Professor	rajendraraut8021@gmail.com	9847166547	Lumbini Engineering College

NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING & RESEARCH, SHAMLA HILLS, BHOPAL MADHYA PRADESH

Name of Programme :Outcome Based Curriculum Development for Computer/Software/IT Engineering Programmes
Course Code :NC-CONSNEP-25/2026-2027
Duration :04-05-2026 To 08-05-2026
Venue :Pokhara University, Nepal
Co-ordinator Sanjay Agrawal

Attendance Sheet

Sl. No.	Name of the Participant Organization	Arrival (Date, Time & Sign)	Departure (Date, Time & Sign)	Day 1 (04-05-2026)	Day 2 (05-05-2026)	Day 3 (06-05-2026)	Day 4 (07-05-2026)	Day 5 (08-05-2026)	Qualified for Certificate (Yes/No)
1	KUNJAN AMATYA Kathmandu Engineering College			—					
2	Birodh Rijal Far Western University						—	—	
3	Nirdosh Adhikari Nepal College of Information Technology								
4	ProfDrSubarna Shakya Prof. Dr. Subarna Shakya Tribhuvan University			—			—	—	
5	Bhesh Bahadur Thapa POKHARA University								

Note: The original copy of this attendance sheet(dully signed by course coordinator) will be sent on the last day of training till 11.30 AM to POC for issuing certificate .

—POC

—Mrs Bhawna 11.5.26

(Sanjay Agrawal)
Course Coordinator(NC-CONSNEP-25/2026-2027)

SI. No.	Name of the Participant Organization	Arrival (Date, Time & Sign)	Departure (Date, Time & Sign)	Day 1 (04-05-2026)	Day 2 (05-05-2026)	Day 3 (06-05-2026)	Day 4 (07-05-2026)	Day 5 (08-05-2026)	Qualified for Certificate (Yes/No)
6	Bilip Bir Paudel Mid-West University								
7	Bharat Keshar khanal Mid west university								
8	Er.JAYA RAJ JOSHI Himalayan WhiteHouse International College								
9	Rajani Chulyadyo Kathmandu University								Repeater
10	Dr. Ram Govinda Aryal Cosmos College of Management and Technology								

Note: The original copy of this attendance sheet(dully signed by course coordinator) will be sent on the last day of training till 11.30 AM to POC for issuing certificate .

Agrawal

(Sanjay Agrawal)
Course Coordinator(NC-CONSNEP-25/2026-2027)

Name of the Participant Organization	Arrival (Date, Time & Sign)	Departure (Date, Time & Sign)	Day 1 (04-05-2026)	Day 2 (05-05-2026)	Day 3 (06-05-2026)	Day 4 (07-05-2026)	Day 5 (08-05-2026)	Qualified for Certificate (Yes/No)
Dr Nitin Bhagat Associate Professor Purbanchal University School of Engineering								
DHIRAJ SHRESTHA Kathmandu University								
Gajendra Sharma Kathmandu University								
Er. Pankaj Raj Dawadi, PhD Department of Computer Science and Engineering, School of Engineering, Kathmandu University								
Santosh Sah Purbanchal University School of Engineering								

te: The original copy of this attendance sheet(dully signed by course coordinator) will be sent on the last day of training till 11.30 AM to POC for issuing certificate .

Agrawal

(Sanjay Agrawal)
Course Coordinator(NC-CONSNEP-25/2026-2027)

Name of the Participant Organization	Arrival (Date, Time & Sign)	Departure (Date, Time & Sign)	Day 1 (04-05-2026)	Day 2 (05-05-2026)	Day 3 (06-05-2026)	Day 4 (07-05-2026)	Day 5 (08-05-2026)	Qualified for Certificate (Yes/No)
Er Shiva Prasad Mahato Khwopa Engineering College								
SUSHANT PAUDEL POKHARA UNIVERSITY								
Bikash Bhattarai Pokhara University								
Shraddha KC School of Engineering, Pokhara University								
Dr. Rajani Chulyadyo rajani.chulyadyo@ku.edu.np Kathmandu University								
Dr. Rajendra Raut Lumbini Engineering College, Bhalwari, Rupandehi			Raje	Raje	Raje	Raje	Raje	

te: The original copy of this attendance sheet(dully signed by course coordinator) will be sent on the last day of training till 11.30 AM to POC for issuing certificate .

(Sanjay Agrawal)
Course Coordinator(NC-CONSNEP-25/2026-2027)

Agrawal

Annexure 3

Revised Programme Structure for Undergraduate Programme in Computer Engineering/ Software Engineering

of

1. **Kathmandu University**
2. **Purbanchal University**
3. **Pokhra University**
4. **Mid Western University**
5. **Tribhuvan University**
6. **Far Western University**

Curriculum of

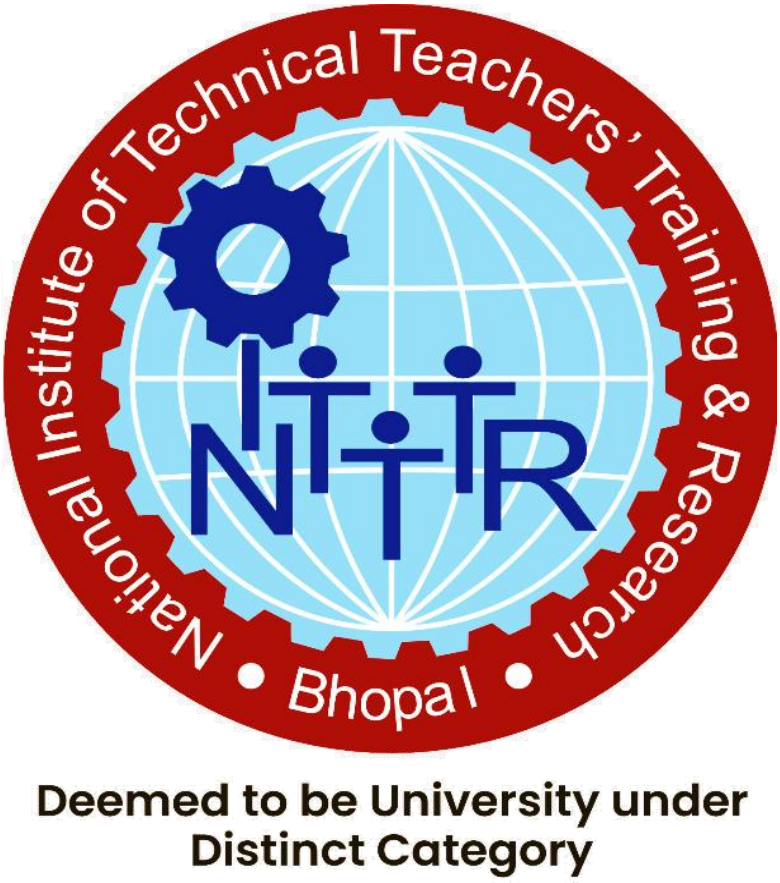
Bachelor of Engineering (Computer Engineering)

Kathmandu University

May, 2026

Kathmandu University,
Dhulikhel, Nepal
ku.edu.np
+977-11-415100
info@ku.edu.np

Curriculum Design and Development
In Collaboration with



National Institute of Technical Teachers' Training & Research (NITTTR), Bhopal
(Deemed to be University under Distinct Category), Shamla Hills, Bhopal (M.P.) 462 002, Ministry of Education, Government of India
Website: http://www.nitttrbpl.ac.in

Preface

VC of Kathmandu University

Acknowledgement

Bhopal
May, 2026

Project Coordinator
Curriculum Design &
Development Project

Introduction:

Kathmandu University (KU) launched a Computer Engineering program for the first time in Nepal in 1994. With more than thirty years of experience in the field of computing, the department possesses a strong background in providing quality education to the students. Continuous interaction, effective contact hours, smart embracing of technology and project work/industry internships are some of the competing factors for KU to be the first choice of students. The diverse set of faculties with a quest for leadership education, each offering updated course materials, is the key point in selecting KU's computing education as the career step for the majority of students in Nepal.

1. Vision & Mission Statements of the University

The vision is **"to become a world-class university devoted to bringing knowledge and technology to the service of mankind".**

The mission is "**to provide quality education for leadership**".

2. Unique Features of the Curriculum Document

This draft program curriculum is designed based on Outcome-Based Education (OBE) philosophy with the following points in mind:

- Courses are designed to be teacher-centric rather than student-centric, while respecting the philosophies of KU and OBE.
- Open electives, and the capstone project are introduced to facilitate interdisciplinary collaboration for solving complex engineering problems.
- Courses having practical and organizational contributions (research and project) are included.
- Priority is given to emerging technologies related and industry demand courses.
- Courses related to humanities and social sciences (such as Health and Mental Well-being, and Buddhist Philosophy) are introduced for students' holistic development.
- Existing courses are updated to make them more suitable for computer engineering.
    - Merged "General Physics I" and "General Physics II" into "Physics for Computing",
    - Merged "Engineering Drawing I" and "Engineering Drawing II" intto "Engineering Drawing and Design Thinking",
    - Changed "Computer Programming" to "Computational Thinking",
    - "Workshop Technology" to "Computer Workshop Technology",
    - "Object-Oriented Programming" to "Programming Language Paradigms",
    - "Introduction to Environmental Engineering" to "Environment, Society and Sustainable Computing",
    - "Communication and Networking" to "Computer Networks",

  - "Computer Graphics" to "Computer Graphics and Game Development",
  - "Operation Research" to "Optimization Theory",
  - "Engineering Management" to "ICT Management"
- Following courses are added:: Theory of Computation as per NEC licensing exam, Data Mining and Data Warehousing, and the Concept of Professional Electives is introduced to enhance the skill set in the specific domain of computing.
- Alternative course for Theory of Computation is Cloud Computing.
- Following existing courses are removed: General Chemistry, Elements of Engineering I, Elements of Engineering II, Discrete Mathematics/Structures, Digital Electronics Laboratory Work, Principles of Programming Languages, System Analysis and Design, and Compiler Design.
- Multiple engineering projects are incorporated to facilitate the development of a project addressing the societal needs.

3. Vision & Mission Statements of the Department

Vision

"To be a nationally leading and globally competent department in computer science and engineering, enhancing excellence in education, research, and innovation in computing for sustainable societal advancement."

Mission

"To provide comprehensive and outcome-based undergraduate and graduate programs in Computer Engineering, Computer Science, Information Technology, and Cyber Security that develop competent, ethical, and innovative professionals, maintaining campus to community collaboration".

4. Programme Educational Objectives (PEOs)

PEO-1 Graduates will excel in their professional careers in computer engineering and related fields.

PEO-2 Graduates will be able to go for higher education and/or research in fields related to computer engineering, especially in emerging technologies.

PEO-3 Graduates will demonstrate leadership and entrepreneurial skills while respecting community values and addressing community needs.

5. Programme Outcomes (POs): - As per NEC

PO-1 **Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialisation as specified in Knowledge and Attitude Profiles (KA1 to KA4), respectively, to develop solutions to complex engineering problems.

PO-2 **Problem Analysis:** Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of

mathematics, natural sciences and engineering sciences with holistic considerations for sustainable development (KA1 to KA4).

PO-3 **Design/development of solutions:** Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole- life cost, net zero carbon as well as resources, cultural, societal, and environmental considerations as required (KA5)

PO-4 **Investigation:** Conduct investigations of complex engineering problems using research methods including research-based knowledge, design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions (KA8). Complex engineering problems are referred to as the problems:

- that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline as against problems given at the end of chapters in a typical textbook that can be solved using simple engineering theories and techniques;
- that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions;
- that require consideration of appropriate constraints / requirements not explicitly given in the problem statement such as cost, power requirement, durability, product life, etc.;
- which need to be defined (modelled) within appropriate mathematical framework; and
- that often require use of modern computational concepts and tools, for example, in the design of an earthquake resistant building.

PO-5 **Modern Tool Usage:** Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering problems (KA2 and KA6)

PO-6 **The Engineer and the Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practices (KA7).

PO-7 **Ethics:** Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (KA9)

PO-8 **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multidisciplinary, face- to-face, remote and distributed settings (KA9)

PO-9 **Communication:** Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, making effective presentations, taking into account cultural, language, and learning differences.

PO-10 **Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making, and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO-11 **Lifelong learning:** Recognise the need for, and have the preparation and ability for:

- independent and life-long learning,
- adaptability to new and emerging technologies, and
- critical thinking in the broadest context of technological change (KA8)

Knowledge and Attitude Profiles (KAs)

KA-1 **Natural and social science:** A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

KA-2 **Mathematics:** Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

KA-3 **Engineering fundamentals:** A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

KA-4 **Specialist knowledge:** Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

KA-5 **Engineering design & operations:** Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

KA-6 **Engineering practice:** Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

KA-7 **Role of Engineering in society:** Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

KA-8 **Research literature:** Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

KA-9 **Ethics and conduct:** Ethics, inclusive behaviour, and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

6. Programme Specific Outcomes (PSOs):

Upon completion of this programme, students will be able to

PSO-1 Analyse, design, and develop hardware solutions for real-world problems using microprocessors, microcontrollers, and embedded systems.

PSO-2 Analyse, design, and develop software solutions for real-world problems using programming languages and software engineering principles.

PSO-3 Apply Artificial Intelligence and Data Analysis techniques to solve contemporary engineering problems.

7. Total Programme Structure with Teaching and Examination Scheme (Semester Wise):

1.	**Title of the Programme**	:	Bachelor of Engineering (Computer Engineering)
2.	**Duration of Programme**	:	Four Years
3.	**Entry Qualification**	:	+2 in Science with 50% score
4.	**Total Marks**	:	4600
5.	**Total Credits**	:	130
6.	**Total Number of Courses**	:	46
7.	**Qualification Awarded**	:	Bachelor of Engineering (BE)

8. Summary of Credits and Marks:

Year	Semester	Credits	Total Marks
Year -1	Semester -I	17	700
	Semester - II	17	600
	Total	**34**	**1300**
Year -2	Semester -III	17	600
	Semester - IV	17	600
	Total	**34**	**1200**
Year -3	Semester -V	17	600
	Semester- VI	17	600
	Total	**34**	**1200**
Year -4	Semester -VII	17	600
	Semester - VIII	12	300
	Total	**29**	**900**
	Grand Total	**131**	**4600**

8. Suggested Category wise Courses:

S. No.	Course Category	Abbreviations	Number of Courses	Total Credits
1.	Applied Science Courses	ASC	8	21
2.	Engineering Science Courses	ESC	3	9
3.	Programme Core Courses	PCC	18	54
4.	Programme Elective Courses	PEC	2	6
5.	Open Electives Courses	OEC	2	6
6.	Humanities, Social Science and Management Courses	HSC	7	18
7.	Project, Internship and Industrial Training	PI	6	17
		Total	**46**	**131**

Semester - I

Faculty Board / Subject Committee	Course Code	Course Category	Course Titles	Credits (C)	Teaching Scheme (Hours)	Examination Scheme (Marks)		Total Marks
						ISA	ESA	
Subject Committee (DoCSE)		ASC	Physics for Computing	3	45	50	50	100
Subject Committee (DoCSE)		ESC	Calculus and Linear Algebra	3	45	50	50	100
Subject Committee (DoCSE)		ESC	Computational Thinking (Programming)	3	45	50	50	100
Subject Committee (DoCSE)		ASC	Engineering Drawing and Design Thinking	2	30	100		100
Subject Committee (DoCSE)		ASC	Computer Workshop Technology	2	30	100		100
Subject Committee (DoCSE)		HSC	Health and Mental Well-being	1	15	100		100
Subject Committee (DoCSE)		HSC	Technical Communication	3	45	50	50	100

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

* Engineering Drawing is kept because of the NEC requirement. Alternative course:

Semester - II

Faculty Board / Subject Committee	Course Code	Course Category	Course Titles	Credits (C)	Teaching Scheme (Hours)	Examination Scheme (Marks)		Total Marks
						ISA	ESA	
Subject Committee (DoCSE)		ESC	Programming Language Paradigms	3	45	50	50	100
Subject Committee (DoCSE)		PCC	Data Structures and Algorithms	3	45	50	50	100
Subject Committee (DoCSE)		ASC	Advanced Calculus	3	45	50	50	100
Subject Committee (DoCSE)		ASC	Environment, Society and Sustainable Computing	2	30	50	50	100
Subject Committee (DoCSE)		PCC	Electronics Engineering	3	45	50	50	100
Subject Committee (DoCSE)		PCC	Computer Graphics and Game Development	3	45	50	50	100

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

Semester - III

Faculty Board / Subject Committee	Course Code	Course Category	Course Titles	Credits (C)	Teaching Scheme (Hours)	Examination Scheme (Marks)		Total Marks
						ISA	ESA	
Subject Committee (DoCSE)		ASC	Statistics and Probability	3	45	50	50	100
Subject Committee (DoCSE)		PCC	Database Management Systems	3	45	50	50	100
Subject Committee (DoCSE)		PCC	Digital Logic	3	45	50	50	100
Subject Committee (DoCSE)		PCC	Algorithms and Complexity	3	45	50	50	100
Subject Committee (DoCSE)		PI	Computer Engineering Project I	2	30	100		100
Subject Committee (DoCSE)		ASC	Differential Equations and Complex Variables	3	45	50	50	100

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

Semester - IV

Faculty Board / Subject Committee	Course Code	Course Category	Course Titles	Credits (C)	Teaching Scheme (Hours)	Examination Scheme (Marks)		Total Marks
						ISA	ESA	
Subject Committee (DoCSE)		PCC	Optimization Theory	3	45	50	50	100
Subject Committee (DoCSE)		PCC	Computer Networks	3	45	50	50	100
Subject Committee (DoCSE)		PCC	Microprocessor and Assembly Language	3	45	50	50	100
Subject Committee (DoCSE)		PCC	Theory of Computation* (Cloud Computing)	3	45	50	50	100
Subject Committee (DoCSE)		PI	Computer Engineering Project II	2	30	100		100
Subject Committee (DoCSE)		ASC	Numerical Methods	3	45	50	50	100

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

* If Theory of Computation is not offered, we will have Cloud Computing in place of Theory of Computation.

Semester - V

Faculty Board / Subject Committee	Course Code	Course Category	Course Titles	Credits (C)	Teaching Scheme (Hours)	Examination Scheme (Marks)		Total Marks
						ISA	ESA	
Subject Committee (DoCSE)		PCC	Artificial Intelligence	3	45	50	50	100
Subject Committee (DoCSE)		HSC	Information System Ethics	3	45	50	50	100
Subject Committee (DoCSE)		PCC	Operating Systems	3	45	50	50	100
Subject Committee (DoCSE)		PCC	Instrumentation and Control	3	45	50	50	100
Subject Committee (DoCSE)		PI	Computer Engineering Project III	2	30	100		100
Subject Committee (DoCSE)		PCC	Computer Architecture and Organization	3	45	50	50	100

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

Semester - VI

Faculty Board / Subject Committee	Course Code	Course Category	Course Titles	Credits (C)	Teaching Scheme (Hours)	Examination Scheme (Marks)		Total Marks
						ISA	ESA	
Subject Committee (DoCSE)		HSC	Engineering Entrepreneurship	3	45	50	50	100
Subject Committee (DoCSE)		PCC	Embedded Systems	3	45	50	50	100
Subject Committee (DoCSE)		HSC	ICT Management	3	45	50	50	100
Subject Committee (DoCSE)		PEC	Professional Elective I	3	45	50	50	100
Subject Committee (DoCSE)		PI	Computer Engineering Project IV	2	30	100		100
Subject Committee (DoCSE)		PCC	Software Engineering	3	45	50	50	100

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

Semester - VII

Faculty Board / Subject Committee	Course Code	Course Category	Course Titles	Credits (C)	Teaching Scheme (Hours)	Examination Scheme (Marks)		Total Marks
						ISA	ESA	
Subject Committee (DoCSE)		PCC	Digital Signal Processing	3	45	50	50	100
Subject Committee (DoCSE)		PCC	Data Mining and Data Warehousing	3	45	50	50	100
Subject Committee (DoCSE)		PEC	Professional Elective II	3	45	50	50	100
Subject Committee (DoCSE)		OEC	Open Elective I	3	45	50	50	100
Subject Committee (DoCSE)		HSC	Buddhist Philosophy	2	30	100		100
Subject Committee (DoCSE)		PI	Capstone Project	3	45	100		100

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

Semester - VIII

Faculty Board / Subject Committee	Course Code	Course Category	Course Titles	Credits (C)	Teaching Scheme (Hours)	Examination Scheme (Marks)		Total Marks
						ISA	ESA	
Subject Committee (DoCSE)		HSC	Engineering Economics	3	45	50	50	100
Subject Committee (DoCSE)		OEC	Open Elective II	3	45	50	50	100
Subject Committee (DoCSE)		PI	Internship	6	90	100		100

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

Elective Tracks

Students will choose two professional electives in semester VI and VII to help them pursue a career in the selected track. We envision three elective tracks for specialization.

AI/ML	Cyber Security	Software Engineering	Smart Governance
● Machine Learning ● Computer Vision ● Natural Language Processing ● Generative AI and LLMs ● Deep Learning ● Image Processing	● Cryptography ● Network and System Administration ● Digital Forensics	● Compiler Design ● Software Architecture ● Software Design Methodologies	● Digital Infrastructure ● Digital Interoperability Framework ● Data-Centric Design

Prepared by:
Prof. Dr. Gajendra Sharma
Dr. Pankaj Raj Dawadi
Mr. Dhiraj Shrestha
Dr. Rajani Chulyadyo

Department of Computer Science and Engineering
Kathmandu University
Dhulikhel, Nepal

Curriculum of Purbanchal University Engineering Programme

in

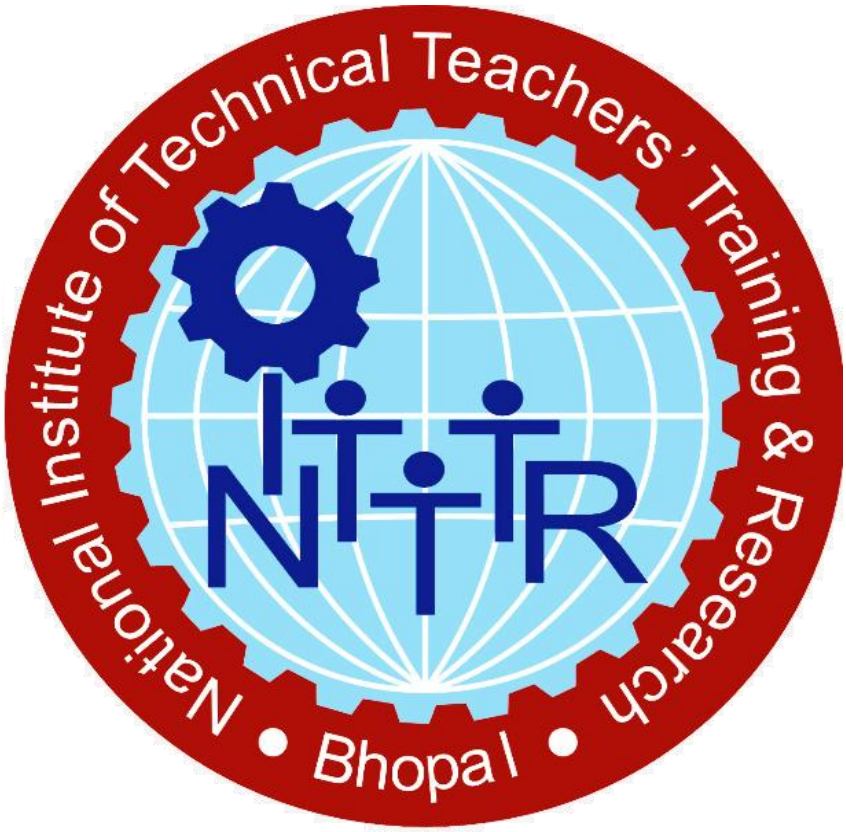
Bachelor in Computer Engineering

Purbanchal University, Nepal

May, 2026

Purbanchal University, Gothgaun,
Morang, Nepal.
www.purbanchaluniversity.edu.np
info@purbuniv.edu.np
977-21-590832

Curriculum Design and Development
In Collaboration with



Deemed to be University under Distinct Category

National Institute of Technical Teachers' Training & Research (NITTTR), Bhopal
(Deemed to be University under Distinct Category), Shamla Hills, Bhopal (M.P.) 462 002, Ministry of Education, Government of India
Website: http://www.nitttrbpl.ac.in

Contents

S. No. **Page Nos.**

Preface

VC of the Respective University

Acknowledgement

Bhopal
May, 2026

Project Coordinator
Curriculum Design &
Development Project,

Title – Design & Development of Programme Structure with Teaching & Examination Scheme for the Identified Programme

Name of the University – Purbanchal University

Programme Title – Bachelor in Computer Engineering

1. Introduction:

The Bachelor in Computer Engineering program of Purbanchal University is a four year (eight semesters) undergraduate program that integrates the study of computer engineering. The program focuses on the design and application of computer systems and provides both strong theoretical knowledge and practical exposure. It prepares students to solve real world problems using engineering principles and modern technologies.

2. **Vision & Mission Statements of the University:**

Vision:

"To develop this university as the model in fulfilling the national objectives of education."

The vision emphasizes addressing national issues such as sustainable development, unemployment, and environmental challenges through education and research.

Mission:

- To provide quality, affordable, and accessible higher education.
- To promote research, teaching, and practical studies for socio-economic development.
- To develop competitive and skilled human resources for national progress.

3. **Vision & Mission Statements of the Department**

Vision:

To become a center of excellence in engineering education and research in South Asia.

Mission:

To produce engineering graduates with strong technical knowledge and professional skills, and to strengthen collaboration between industry and academic institutions.

4. Programme Educational Objectives (PEOs):

1. Graduates establish successful careers as software developers and computer engineering professionals by practicing to develop reliable computing solutions for real world problems.
2. Graduates pursue higher studies, research, innovation, and continuous professional development in emerging areas of computer engineering and related technologies.
3. Graduates demonstrate entrepreneurship ability to create employment opportunities and contribute to the growth of the technology sector.

5. Programme Outcomes (POs): - As per NEC

PO-1 **Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialization as specified in Knowledge and Attitude Profiles (KA1 to KA4) respectively to develop solutions to complex engineering problems.

PO-2 **Problem Analysis:** Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences with holistic considerations for sustainable development (KA1 to KA4).

PO-3 **Design/development of solutions:** Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole- life cost, net zero carbon as well as resources, cultural, societal, and environmental considerations as required (KA5)

PO-4 **Investigation:** Conduct investigations of complex engineering problems using research methods including research-based knowledge, design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions (KA8). Complex engineering problems are referred to as the problems:

- that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline as against problems given at the end of chapters in a typical textbook that can be solved using simple engineering theories and techniques;
- that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions;
- that require consideration of appropriate constraints / requirements not explicitly given in the problem statement such as cost, power requirement, durability, product life, etc.;
- which need to be defined (modelled) within appropriate mathematical framework; and
- that often require use of modern computational concepts and tools, for example, in the design of an earthquake resistant building.

PO-5 **Modern Tool Usage:** Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering problems (KA2 and KA6)

PO-6 **The Engineer and the Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practices (KA7).

PO-7 **Ethics:** Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (KA9)

PO-8 **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multidisciplinary, face- to-face, remote and distributed settings (KA9)

PO-9 **Communication:** Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, making effective presentations, taking into account cultural, language, and learning differences.

PO-10 **Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO-11 **Lifelong learning:** Recognize the need for, and have the preparation and ability for:

- independent and life-long learning,
- adaptability to new and emerging technologies, and
- critical thinking in the broadest context of technological change (KA8)

Knowledge and Attitude Profiles (KAs)

KA-1 **Natural and social science:** A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

KA-2 **Mathematics:** Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

KA-3 **Engineering fundamentals:** A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

KA-4 **Specialist knowledge:** Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

KA-5 **Engineering design & operations:** Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

KA-6 **Engineering practice:** Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

KA-7 **Role of Engineering in society:** Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

KA-8 **Research literature:** Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

KA-9 **Ethics and conduct:** Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

6. Programme Specific Outcomes (PSOs):

PSO-1 Graduates will be able to design, develop, test, and deploy efficient software systems and computing solutions using appropriate programming languages, algorithms, and modern development tools to address real world problems.

PSO-2 Graduates will be able to apply emerging technologies such as Artificial Intelligence, Data Analytics, and Cloud Computing to develop innovative solutions while adhering to professional ethics, societal needs, and sustainable practices.

Justification for Curriculum Revision and Proposed Changes:

1. The curriculum focuses on Outcome Based Education (OBE) principles by emphasizing competency based learning, measurable learning outcomes, and student-centered teaching practices.
2. The programme structure focuses on achieving Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) through practical learning, project work and industry oriented activities.
3. The curriculum focuses on developing technical knowledge, programming skills, problem solving ability, communication skills, teamwork, ethical responsibility, and lifelong learning competencies required for professional engineers.
4. Existing courses are revised, updated, and replaced to align the curriculum with modern technological advancements, industry requirements, practical learning approaches, and emerging career opportunities in computer engineering.
5. The programme focuses on continuous assessment, practical implementation, and modern learning approaches to improve graduate employability and professional competency.
6. Object Oriented Programming is focused to develop basic object oriented programming concepts, programming practices and software development skills using Java programming.
7. Web Design & Development focuses on responsive website development, frontend-backend integration, APIs, and modern full-stack development practices.
8. Advanced Programming Concepts focus on modern software technologies, web applications, and smart system development using current development practices.
9. Mobile Application Development is introduced to prepare students for the growing mobile technology industry through development of smartphone-based applications.
10. Professional Ethics & Values focuses on professional behavior, teamwork, communication skills, ethical responsibility, and workplace professionalism.
11. Cyber Security & Ethical Hacking focuses on digital security, system protection, vulnerability identification, and prevention of cyber threats and attacks.
12. Industry oriented software practices are integrated to provide knowledge of modern development methods, software lifecycle practices, and collaborative development environments.
13. Project based learning activities are strengthened to improve innovation, practical implementation skills, teamwork, and research capability among students.
14. Specialization based elective courses are introduced to help students develop domain specific expertise according to industry demand and career interests.
15. Open elective courses are introduced to provide interdisciplinary knowledge, creativity, innovation, and flexible learning opportunities in emerging technology areas.

7. Total Programme Structure with Teaching and Examination Scheme (Semester Wise):

1.	**Title of UG Engg./ Tech. Programme**	:	Bachelor in Computer Engineering
2.	**Duration of Programme**	:	Four Years
3.	**Entry Qualification**	:	+2 in Science/Diploma in Engineering/ 9-12 T SLC in Computer
4.	**Total Marks**	:	6100
5.	**Total Credits**	:	151
6.	**Total Number of Courses**	:	49
7.	**Qualification Awarded**		
	BE in Computer Engineering	:	151 Credits

8. Summary of Credits and Marks:

Year	Semester	Credits	Total Marks
Year -1	Semester -I	20	775
	Semester - II	18	775
Total			
Year -2	Semester -III	20	800
	Semester - IV	18	775
Total			
Year -3	Semester -V	20	825
	Semester- VI	18	775
Total			
Year -4	Semester -VII	19	750
	Semester - VIII	18	625
Total			
Grand Total		**151**	6100

8. Suggested Category wise Courses:

S. No.	Course Category	Abbreviations	Number of Courses	Total Credits
1.	Applied Science Courses	ASC	5	15
2.	Engineering Science Courses	ESC	11	31
3.	Programme Core Courses	PCC	19	57
4.	Programme Elective Courses	PEC	3	9
5.	Open Elective Courses	OEC	2	6
6.	Humanities, Social Science and Management Courses	HSC	4	14
7.	Project, Internship and Industrial Training	PI	5	19
	Total		**49**	**151**

Bachelor in Computer Enineering

Semester - I

Subject Committee/ Faculty Board	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		ASC	Engineering Mathematics I	3	3	3	-	6	40	60	-	-	100
		ASC	Applied Physics	3	3	2	2	7	40	60	25	-	125
		PCC	Programming for Problem solving	3	3	2	3	8	40	60	30	20	150
		HSC	English for Technical Communication	3	3	1	2	6	40	60	25	-	125
		ESC	Fundamental of Computing Technology	3	3	1	2	6	40	60	25	-	125
		ESC	Computer Workshop	2	1	-	2		10	-	40		50
		ESC	Engineering Drawing & Visualization	3	1		3			60	-	40	100
				20	18	9	14						775

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - II**

Subject Committee/ Faculty Board	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		ASC	Engineering Mathematics II	3	3	3		6	40	60	-	-	100
		ASC	Applied Chemistry	3	3	2	2	7	40	60	25	-	125
		PCC	Object Oriented Programming	3	3	2	3	8	40	60	30	20	150
		ESC	Digital Logic	3	3	1	3	7	40	60	25	-	125
		ESC	Basic Electrical Engineering	3	3	1	2	6	40	60	25	-	125
		PCC	Web Design & Development (UI/UX, MERN, API, VCS)	3	3	1	2	6	40	60	30	20	150
				18									775

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in …… **Semester - III**

Subject Committee/ Faculty Board	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		ASC	Engineering Mathematics III	3	3	3	-	6	40	-	60		100
		PCC	Data Structure and Algorithm	3	3	1	3	7	40	30	60	20	150
		PCC	Object Oriented Analysis and Desing	3	3	1	1	4	40	25	60	-	125
		PCC	Computer Graphics	3	3	1	2	6	40	60	30	20	150
		ESC	Electronic Device and Circuits	3	3	1	2	6	40	60	25	-	125
		HSC	Professional Ethics & Values	2	2	1	-	3	20	30	-	-	50
		PI	Project-II	3	1	-	3	4	-	-	60	40	100
				20									800

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - IV**

Subject Committee/ Faculty Board	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		HSC	Probability & Statistics	3	3	2	2	7	40	60	30	20	150
		PCC	Database Management System (SQL,NoSQL)	3	3	1	3	7	40	60	30	20	150
		ESC	Microprocessor	3	3	2	3	8	40	60	50	-	150
		ESC	Communication System	3	3	1	2	6	40	60	25	-	125
		PCC	Advance Python Programming (Django, Flask,Kivy,MicroPython)	3	3	2	3	8	40	60	30	20	150
		ESC	Discrete Structure	3	3	2	-	5	40	60	-	-	100
				18									775

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - V**

Subject Committee/ Faculty Board	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		PCC	Algorithm Analysis and Design	3	3	2	-	5	40	60	-	-	100
		PCC	Computer Architecture and Design	3	3	1	2	6	40	60	25	-	125
		ESC	Numerical Method	3	3	1	3	7	40	60	30	20	150
		PCC	Operating System	3	3	1	3	7	40	60	30	20	150
		PCC	Mobile Application Development	3	3	1	3	7	40	60	30	20	150
		ESC	Research Methodology	2	2	1	-	3	20	30	-	-	50
		PI	Project-II	3	1	-	3	4	-	-	60	40	100
				20									825

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in …….. **Semester - VI**

Subject Committee/ Faculty Board	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		PCC	Artificial Intelligence	3	3	1	3	7	40	60	25	-	125
		PCC	Computer Network (Network Security)	3	3	1	3	7	40	60	30	20	150
		HSC	Engineering Economics	3	3	2	-	5	40	60	-	-	100
		PCC	Internet of Things (IOT)	3	3	1	2	6	40	60	25	-	125
		PCC	Software Project Management & Engineering (SCE,SPM)	3	3	1	-	4	40	60	-	-	100
		PEC	Elective I	3	3	1	2	6	40	60	25	-	125
				18									775

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - VII**

Subject Committee/ Faculty Board	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		PCC	Distributed & Cloud Computing	3	3	1	2	6	40	60	25	-	125
		PCC	*Theory of Computation	3	3	2	2	5	40	60	25	-	125
		HSC	Engineering Ethics and Human Values	3	3	1	-	4	40	60	-	-	100
		OEC	Open Elective-II	3	3	1	2	6	40	60	25	-	125
		PEC	Elective-II	3	3	1	2	6	40	60	25	-	125
		PI	Capstone Project (PART I)	4	1	-	3	4	-	-	100	50	150
				19									750

* Discussion Required

Modified

Changed/Replace

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - VIII**

Subject Committee/ Faculty Board	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		PCC	Cyber Security & Ethical Hacking	3	3	1	2	6	40	60	25	-	125
		PEC	Elective-III	3	3	1	2	6	40	60	25	-	125
		PI	Capstone Project (PART II)	6	1	-	4	5	-	-	100	50	150
		PI	Internship	3	3	1	-	4	-	-	60	40	100
		OEC	Open Elective-II	3	3	1	2	6	40	60	25	-	125
				18									625

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

SPECIALIZATION BASED ELECTIVE STRUCTURE

To develop domain expertise and industry-oriented skills, elective subjects are organized into specialization groups. Each group is designed to prepare students for specific professional careers and advanced technological fields.

Students must select one specialization group and continue all electives within the same group.

GROUP A: AI & MACHINE LEARNING ENGINEER

Expertise Area:

Artificial Intelligence, Intelligent Systems, Machine Learning, Deep Learning, NLP, Generative AI

Elective	Subject
Elective I	Machine Learning
Elective II	Deep Learning
Elective III	Natural Language Processing (NLP)
	Generative AI & Large Language Models (LLMs)

GROUP B: DATA ENGINEERING & ANALYTICS

Expertise Area:

Data Processing, Data Warehousing, Big Data, Analytics, Data Infrastructure

Elective	Subject
Elective I	Data Science
Elective II	Data Mining and Data Warehousing
Elective III	Big Data Technologies
	Business Intelligence

GROUP C: CYBER SECURITY & ETHICAL HACKING

Expertise Area:

System Security, Web Security, Vulnerability Analysis, Secure Computing

Elective	Subject
Elective I	Cryptography & Information Security
Elective II	Software Security
Elective III	Web Security
	Vulnerability Assessment & Penetration Testing (VAPT)

GROUP D: SOFTWARE ENGINEERING & APPLICATION DEVELOPMENT

Expertise Area:

Software Development, Software Design, Databases, User Experience

Elective	Subject
Elective I	DevOps & Software Development
Elective II	Advance Mobile Application Development
Elective III	Software Quality Assurance &Testing
	Human Computer Interaction

OPEN ELECTIVES:

Subject
Robotics & Automation
Drone Technology
Digital Solution for climate Change
GIS
Bioinformatics
Image Processing & Pattern Recognition
Digital Governance
Green Computing
Digital Promotion & Marketing
Disaster Management
Entrepreneurship Development

Prepared By:

Name	Designation	University/College
Dr. Nitin Bhagat bhagatnitin312@gmail.com ,9842122666	Associate Professor	Purbanchal University School of Engineering (PUSoE)
Er. Santosh Sah sah.santosh@gmail.com, santosh@pufoe.edu.np, 9851125911	Assistant Lecturer	Purbanchal University School of Engineering (PUSoE)
Er. Shiva Prasad Mahato spmmahato@gmail.com ,9841402187	Senior Lecturer	Khwopa Engineering College
Er. Jaya Raj Joshi, Jayarajjoshi5093@gmail.com, 9868415093	Senior Lecturer	Himalayan Whitehouse International College

Curriculum of UG Engineering Programme

in

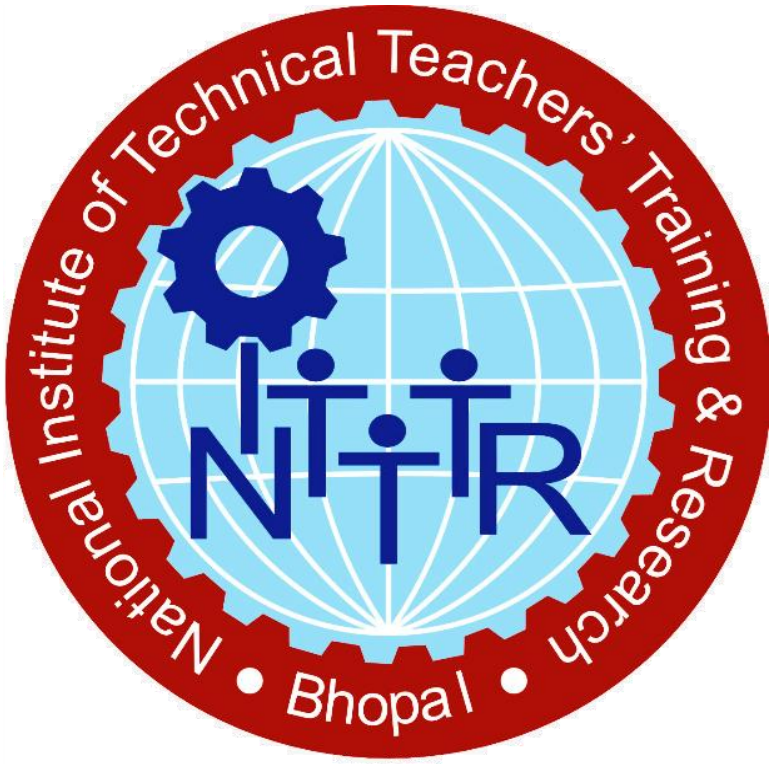
Computer Engineering

Pokhara University

May, 2026

Pokhara University
Dhungepatan, Pokhara-32
www.pu.edu.np
+977-61504046

Curriculum Design and Development
In Collaboration with



Deemed to be University under Distinct Category

National Institute of Technical Teachers' Training & Research (NITTTR), Bhopal
(Deemed to be University under Distinct Category), Shamla Hills, Bhopal (M.P.) 462 002, Ministry of Education, Government of India
Website: http://www.nitttrbpl.ac.in

Contents

S. No. **Page Nos.**

Preface

VC of the Respective University

Acknowledgement

Bhopal
May, 2026

Project Coordinator
Curriculum Design &
Development Project,

Task – 2

Title – Design & Development of Programme Structure with Teaching & Examination Scheme for the Identified Programme

Name of the University – Pokhara University

Programme Title – Bachelor's Degree in Computer Engineering

1. Introduction:

2. Vision & Mission Statements of the University:

Vision: *To be center of excellence for producing innovative, ethical, and globally competent Engineers*

Mission : *To develop the institution into a Center of Excellence for Higher Education by enhancing teaching, learning, and research activities in the field of Engineering.*

Vision & Mission Statements of the Department

Vision: *To be a leading Department producing innovative, ethical, and globally competent Computer Engineers for technological and national development.*

Mission *: To provide quality and practical Computer Engineering education through teaching, research, innovation, and community engagement, and to develop skilled, responsible, and industry-ready professionals capable of solving real-world technological challenges.*

3. Programme Educational Objectives (PEOs):

PEO1: *Graduates will be able to work successfully as competence Computer Engineers in areas like software development, hardware design, networking and emerging technologies.*

PEO2: *Graduate will be able to pursue higher education and conduct research in the area of Computer Science and Engineering.*

PEO3: *Graduates will be able to create and manage technology driven ventures related to software products and services.*

PE04: *Graduates will engage in continuous learning and be able to adapt to changing technology landscape and industry needs.*

4. Programme Outcomes (POs): - As per NEC

PO-1 **Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialization as specified in Knowledge and Attitude Profiles (KA1 to KA4) respectively to develop solutions to complex engineering problems.

PO-2 **Problem Analysis:** Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences with holistic considerations for sustainable development (KA1 to KA4).

PO-3 **Design/development of solutions:** Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole- life cost, net zero carbon as well as resources, cultural, societal, and environmental considerations as required (KA5)

PO-4 **Investigation:** Conduct investigations of complex engineering problems using research methods including research-based knowledge, design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions (KA8). Complex engineering problems are referred to as the problems:

- that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline as against problems given at the end of chapters in a typical textbook that can be solved using simple engineering theories and techniques;
- that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions;
- that require consideration of appropriate constraints / requirements not explicitly given in the problem statement such as cost, power requirement, durability, product life, etc.;
- which need to be defined (modelled) within appropriate mathematical framework; and
- that often require use of modern computational concepts and tools, for example, in the design of an earthquake resistant building.

PO-5 **Modern Tool Usage:** Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering problems (KA2 and KA6)

PO-6 **The Engineer and the Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practices (KA7).

PO-7 **Ethics:** Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (KA9)

PO-8 **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multidisciplinary, face- to-face, remote and distributed settings (KA9)

PO-9 **Communication:** Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, making effective presentations, taking into account cultural, language, and learning differences.

PO-10 Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO-11 Lifelong learning: Recognize the need for, and have the preparation and ability for:

- independent and life-long learning,
- adaptability to new and emerging technologies, and
- critical thinking in the broadest context of technological change (KA8)

Knowledge and Attitude Profiles (KAs)

KA-1 Natural and social science: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

KA-2 Mathematics: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

KA-3 Engineering fundamentals: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

KA-4 Specialist knowledge: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

KA-5 Engineering design & operations: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

KA-6 Engineering practice: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

KA-7 Role of Engineering in society: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

KA-8 Research literature: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

KA-9 Ethics and conduct: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

5. Programme Specific Outcomes (PSOs):

PSO-1 Graduates will be able to analyze, design, develop, and maintain secure **software systems** using modern programming, virtualization, deployment and management tools and technologies.

PSO-2 Graduates will be able to analyze, design, implement, and manage secure **computer networks** using modern networking technologies, security mechanisms, and network management tools.

6. Total Programme Structure with Teaching and Examination Scheme (Semester Wise):

1.	**Title of UG Engg./ Tech. Programme**	:	Computer Engineering
2.	**Duration of Programme**	:	Four Years
3.	**Entry Qualification**	:	12^{th} or equivalent (Science Stream)
4.	**Total Marks**	:	4600
5.	**Total Credits**	:	155
6.	**Total Number of Courses**	:	46
7.	**Qualification Awarded**		
	BE/ B.Tech.	:155	Credits

8. Summary of Credits and Marks:

Year	Semester	Credits	Total Marks
Year -1	Semester -I	18	800
	Semester - II	17	700
Total		**35**	**1500**
Year -2	Semester -III	18	600
	Semester - IV	18	600
Total		**36**	**1200**
Year -3	Semester -V	17	600
	Semester- VI	17	600
Total		**34**	**1200**
Year -4	Semester -VII	11	500
	Semester - VIII	13	400
Total		**24**	**900**
Grand Total		**155**	**4600**

7. Suggested Category wise Courses:

S. No.	Course Category	Abbreviations	Number of Courses	Total Credits
1.	Applied Science Courses	ASC	6	18
2.	Engineering Science Courses	ESC	7	14
3.	Programme Core Courses	PCC	22	66
4.	Programme Elective Courses	PEC	1	3
5.	Open Electives Courses	OEC	1	3
6.	Humanities, Social Science and Management Courses	HSC	5	11

7.	Project, Internship and Industrial Training	PI	6	19
Total			**46**	**155**

UG Engg. /Tech. Programme in Computer Engineering **Semester - I**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		ASC	Mathematics for Engineers I (Linear Algebra)	3	3	1	0	4					
		HSC	Communication Techniques	2	2	1	0	3					
		PCC	Computer Programming (C & C++)	3	3	1	3	7					
		ESC	Basic Electrical and Electronics	3	3	1	2	6					
		PCC	Computer Workshop	1	0	0	3	3					
		ASC	Physics for Computing	3	3	1	2	6					
		PCC	Digital logic	3	3	1	2	6					
				18									

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - II**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		ASC	Mathematics for Engineers II (Calculus I)	3	3	1	0	4					
		ESC	Problem solving Techniques	3	3	1	0	4					
		PCC	Computer Architecture	3	3	1	2	6					
		PCC	Data Structure and Algorithm	3	3	1	2	6					
		PCC	Operating System	3	3	1	2	6					
		HSC	Environment and Society	2	2	0	0	2					
				17									

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in …… **Semester - III**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		ASC	Mathematics for Engineers III (Calculus II)	3	3	1	0	4					
		PCC	Database Management System I	3	3	1	2	6					
		PCC	Computer Network	3	3	1	2	6					
		PCC	Microprocessor & Microcontroller	3	3	1	2	6					
		HSC	Research Fundamentals	2	2	1	0	3					
		PCC	Software Engineering I	3	3	1	2	6					
				17									

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - IV**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		ASC	Discrete Mathematics	3	3	1	0	4					
		HSC	Entrepreneurship Development	2	2	1	0	3					
		PCC	Embedded Systems	3	3	1	2	6					
		PCC	Artificial Intelligence	3	3	1	2	6					
		PCC	Enterprise Application Development with Java	3	3	1	2	6					
		PCC	Database Management System II	3	3	1	2	6					
				17									

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - V**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		ASC	Probability & Statistics	3	3	1	0	4					
		PCC	Software Defined Network	3	3	1	2	6					
		HSC	Engineering Management	2	2	0	0	2					
		PCC	Data Mining and Warehousing	3	3	1	2	6					
		PCC	Software Engineering II	3	3	1	2	6					
		PEC	Program Elective I	3	3	1	2	6					
				17									

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in …….. **Semester - VI**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		ESC	Agent Based Modeling	3	3	1	2	6					
		PCC	Professional Practice/Ethics	3	3	1	2	6					
		PCC	Network Security	3	3	1	2	6					
		PCC	Analysis and Design of Algorithms	3	3	1	2	6					
		PCC	Machine Learning using Python	3	3	1	2	6					
		OEC	Open Elective I	3	3	1	2	6					
				18									

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - VII**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		PCC	Deep Learning	3	3	1	2	6					
		HSC	Engineering Economics	2	2	1	0	3					
		HSC	ICT Project Management	3	3	1	0	4					
		PEC	Program Elective II	3	3	1	2	6					
		PI	Minor Project	6	0	0	6	6					
				17									

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - VIII**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		PI	Major Project	10	0	0	10	10					
		PI	Internship	3	0	0	3	3					
		OEC	Open Elective II	3	3	1	0	3					
				16									

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

**** It is recommended to request NEC to rethink about the inclusion/exclusion of the contents of Theory of Computations from syllabus of Licensing exam.s*

List of Program Elective Courses

Course	Stream/Specialization Track
1. Software Architecture and Design Patterns 2. Agile Software Development and DevOps 3. Human Computer Interaction (HCI) 4. Microservices Architecture 5. Natural Language Processing 6. Big Data Analytics 7. Computer Vision 8. Business Intelligence Systems 9. Mobile Application Development 10. Application Security 11. Theory of Computation 12. Image Processing and Pattern Recognition 13. Digital Signal Processing & Analysis 14. Simulation and Modelling	Software Engineering
15. Enterprise Network Design and Architecture 16. Advanced Routing and Switching 17. Software Defined Networking (SDN) 18. High Speed Networks 19. Ad Hoc and Sensor Networks 20. Network Management Systems (NMS) 21. Security Operations Center (SOC) Technologies	Networking

List of Open Elective Courses

Course	Offering Department (Potential)
1. Technology Policy and Governance	
2. Technology Commercialization	
3. Product Management	
4. Cyber Law and Digital Governance	
5. Intellectual Property Rights	
6. Privacy and Data Protection	
7. Fundamentals of Financial Technology (FinTech)	
8. Personal Health and Wellbeing	

Prepared by:

1. Dr. Rajendra Raut
2. Dr. Ram Govinda Aryal
3. Er. Nirdosh Adhikari

Task – 2

Title – Design & Development of Programme Structure with Teaching & Examination Scheme for the Identified Programme

Name of the University – Pokhara University
Programme Title – BE in Software Engineering

1. **Introduction:**
   Software Engineering is a disciplined approach to designing, developing, testing, and maintaining software systems. The BE in Software Engineering program at Pokhara University aims to provide students with strong theoretical knowledge and practical skills in modern software development. It covers key areas such as programming, software design, databases, and system development life cycle. The program emphasizes problem-solving, teamwork, and professional ethics. Students are prepared to develop reliable and efficient software solutions for real-world applications. Graduates are equipped to adapt to evolving technologies and contribute effectively to the software industry.
2. **Vision & Mission Statements of the University:**
   To be a leading academic institution in Software Engineering education, fostering innovation, research, and technological advancement to produce globally competent software professionals. To provide quality Software Engineering education at Pokhara University by combining theory and practical skills. The program aims to develop competent graduates who can build reliable software, promote innovation and ethics, and meet the needs of the global software industry.
3. **Vision & Mission Statements of the Department:**
   To be a center of excellence in Software Engineering education, producing innovative and globally competent software professionals. To provide quality education in Software Engineering under Pokhara University by combining theory with practical skills. The department aims to develop capable graduates, encourage innovation and research, promote ethical practices, and prepare students to solve real-world software challenges.

4. **Programme Educational Objectives (PEOs):**

PEO-1 Apply engineering knowledge and problem-solving skills to develop high-quality software systems.
PEO-2 Build successful careers in software engineering, research, or advanced studies in line with global standards.
PEO-3 Contribute to society by developing sustainable and user-centered software solutions.

5. **Programme Outcomes (POs): - As per NEC**

PO-1 **Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialization as specified in Knowledge and Attitude Profiles (KA1 to KA4) respectively to develop solutions to complex engineering problems.

PO-2 **Problem Analysis:** Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of

mathematics, natural sciences and engineering sciences with holistic considerations for sustainable development (KA1 to KA4).

PO-3 **Design/development of solutions:** Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole- life cost, net zero carbon as well as resources, cultural, societal, and environmental considerations as required (KA5)

PO-4 **Investigation:** Conduct investigations of complex engineering problems using research methods including research-based knowledge, design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions (KA8). Complex engineering problems are referred to as the problems:

- that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline as against problems given at the end of chapters in a typical textbook that can be solved using simple engineering theories and techniques;
- that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions;
- that require consideration of appropriate constraints / requirements not explicitly given in the problem statement such as cost, power requirement, durability, product life, etc.;
- which need to be defined (modelled) within appropriate mathematical framework; and
- that often require use of modern computational concepts and tools, for example, in the design of an earthquake resistant building.

PO-5 **Modern Tool Usage:** Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering problems (KA2 and KA6)

PO-6 **The Engineer and the Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practices (KA7).

PO-7 **Ethics:** Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (KA9)

PO-8 **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multidisciplinary, face- to-face, remote and distributed settings (KA9)

PO-9 **Communication:** Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, making effective presentations, taking into account cultural, language, and learning differences.

PO-10 **Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO-11 Lifelong learning: Recognize the need for, and have the preparation and ability for:

- independent and life-long learning,
- adaptability to new and emerging technologies, and
- critical thinking in the broadest context of technological change (KA8)

Knowledge and Attitude Profiles (KAs)

KA-1 Natural and social science: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

KA-2 Mathematics: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

KA-3 Engineering fundamentals: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

KA-4 Specialist knowledge: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

KA-5 Engineering design & operations: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

KA-6 Engineering practice: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

KA-7 Role of Engineering in society: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

KA-8 Research literature: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

KA-9 Ethics and conduct: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

6. Programme Specific Outcomes (PSOs):

PSO-1: Apply software engineering principles, programming skills, and modern tools to design and develop efficient software systems.

PSO-2: Analyze, solutions for complex real-world problems with quality, security, and usability considerations.

7. Total Programme Structure with Teaching and Examination Scheme (Semester Wise):

1.	**Title of UG Engg./ Tech. Programme**	:	BE in Software Engineering
2.	**Duration of Programme**	:	Four Years
3.	**Entry Qualification**	:	12th Standard in Science Stream
4.	**Total Marks**	:	
5.	**Total Credits**	:	141 Credit Hours
6.	**Total Number of Courses**	:	50
7.	**Qualification Awarded** **BE in Software Engineering**	:	141 Credits

8. Summary of Credits and Marks:

Year	Semester	Credits	Total Marks
Year -1	Semester -I	18	700
	Semester - II	17	700
Total			
Year -2	Semester -III	18	700
	Semester - IV	16	700
Total			
Year -3	Semester -V	18	700
	Semester- VI	18	700
Total			
Year -4	Semester -VII	16	700
	Semester - VIII	18	400
Total			
Grand Total		**141**	5300

8. Suggested Category wise Courses:

S. No.	Course Category	Abbreviations	Number of Courses	Total Credits
1.	Applied Science Courses	ASC		
2.	Engineering Science Courses	ESC		
3.	Programme Core Courses	PCC	28	
4.	Programme Elective Courses	PEC	-	-
5.	Open Electives Courses	OEC	3	8
6.	Humanities, Social Science and Management Courses	HSC	7	
7.	Project, Internship and Industrial Training	PI	3	11
Total			**46**	**136**

UG Engg. /Tech. Programme in BESE **Semester - I**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
Subject Committee	MTH 110		Mathematics for Computing I	3	3	2	0	5	50	50	-	-	100
Subject Committee	NNV 122		Nepalese Norms and Values	1	1	1	0	2	50	50	-	-	100
Subject Committee	ENG 110		Communication Skills	2	2	1	0	3	35	35	15	15	100
Subject Committee	ELX 110		Digital Logic	3	3	1	2	6	35	35	15	15	100
Subject Committee	CMP 124		Programming in C	3	3	1	3	7	30	30	20	20	100
Subject Committee	MTH 120		Entrepreneurship for Tech Students	2	3	1	0	4	50	50	-	-	100
Subject Committee	MEC 116		Digital Productivity Tools Lab	2	2	1	2	5	30	30	20	20	100
				16									700

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in BESE **Semester - II**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
Subject Committee	MTH 150		Mathematics for Computing II	3	3	2	0	5	50	50	-	-	100
Subject Committee	ELX 176		Microprocessor and Computer Architecture	3	3	1	2	6	35	35	15	15	100
Subject Committee	CMP 180		Entrepreneurship Practices and Startup	2	3	1	0	4	50	50	-	-	100
Subject Committee	CMP 340		Object Oriented Programming	3	3	1	2	6	35	35	15	15	100
Subject Committee	CMP 168		Web Design and Development	3	3	1	3	7	30	30	20	20	100
Subject Committee	PHY 110		Engineering Physics	3	3	2	2	7	50	50	-	-	100
				17									700

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in …… **Semester - III**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
Subject Committee	MTH 210		Mathematics for Computing III	3	3	2	0	5	50	50	-	-	100
Subject Committee	CMP 222		Database Management Systems	3	3	1	3	7	30	30	20	20	100
Subject Committee	CMP 160		Algorithm and Problem Solving	3	3	1	3	7	30	30	20	20	100
Subject Committee	MTH 216		Cloud Computing Fundamentals	2	2	2	0	4	50	50	-	-	100
Subject Committee	CMP 220		Object Oriented Programming with java	3	3	1	3	7	30	30	20	20	100
Subject Committee	CMP 230		Software Engineering	3	3	1	2	6	50	50	-	-	100
Subject Committee	CMP 231		DevOps and GIT Workflows Lab	1	1	0	1	2	25	25	25	25	100
													700

Legen

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in BESE **Semester - IV**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
Subject Committee	CMP 274		Computer Graphics and Multimedia	3	3	1	2	6	35	35	15	15	100
Subject Committee	CMP 280		System programming	3	3	1	2	6	35	35	15	15	100
Subject Committee	MTH 252		API Development and Integration	2	2	1	2	5	30	30	20	20	100
Subject Committee	CMP 272		Analysis and Design of Algorithm	3	3	1	3	7	30	30	20	20	100
Subject Committee	CMP 278		UML	3	3	1	2	6	35	35	15	15	100
Subject Committee	CMP 270		Computer Networks	3	3	1	1	5	40	40	20	20	100
				16									600

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in BESE **Semester - V**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
Subject Committee	CMP 226		Applied Operating System	3	3	1	2	6	35	35	15	15	100
Subject Committee	CMP 334		Full Stack Web Development	3	3	1	2	6	35	35	15	15	100
Subject Committee	CMP 338		Simulation and Modeling	3	3	1	2	6	35	35	15	15	100
Subject Committee	HCI 339		Human Computer Interaction	2	2	1	1	4	40	40	10	10	100
Subject Committee	CMP 341		Big Data Analytics	2	2	1	2	5	30	30	20	20	100
Subject Committee	CMP 342		Introduction to Artificial Intelligence and Machine Learning	3	3	1	3	7	30	30	20	20	100
				16									600

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in …….. **Semester - VI**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
Subject Committee	CMP 376		Agile Software Development	3	3	1	2	6	35	35	15	15	100
Subject Committee	MGT 320		Engineering Economics and Management	2	2	1	0	3	50	50	-	-	100
Subject Committee	CMP 382		Software Dependability	3	3	1	2	6	35	35	15	15	100
Subject Committee			Open Elective I	2	3	1	1	5	40	40	10	10	100
Subject Committee	PRJ 360		Project I	2	0	0	3	3	-	-	50	50	100
Subject Committee	CMP 362		Image Processing and Pattern Recognition	3	3	1	2	6	35	35	15	15	100
Subject Committee	MAD 360		Mobile Application Development	3	3	1	2	6	35	35	15	15	100
				18									700

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - VII**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
Subject Committee	CMP 421		AI on Cloud Computing	2	2	1	1	4	40	40	10	10	100
Subject Committee	CMP 442		Distributed System	3	3	1	2	6	35	35	15	15	100
Subject Committee	CMP 440		Block Chain and Web3 Fundamentals	3	3	1	2	6	35	35	15	15	100
Subject Committee			Open Elective II	3	3	1	1	5	40	40	10	10	100
Subject Committee	CMP 433		Cybersecurity	3	3	1	2	6	40	40	10	10	100
Subject Committee	CMP 435		AI Ethics and Policy	2	2	1	0	3	50	50	-	-	100
				16									600

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in BESE **Semester - VIII**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
Subject Committee			**Industrial Internship**	**3**	**0**	**0**	**3**				**50**	**50**	**100**
Subject Committee	**PRJ 452**		**Project II**	**6**	**0**	**0**	**5**	**5**	**-**	**-**	**50**	**50**	**100**
Subject Committee			**Open Elective III**	**3**	**3**	**1**	**2**	**6**	**35**	**35**	**15**	**15**	**100**
Subject Committee	**CMP**		**Generative AI**	**3**	**3**	**1**	**2**	**6**	**35**	**35**	**15**	**15**	**100**
				15									**400**

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Programme Core Courses (PCC), Programme Elective Courses (PEC), Open Electives Courses (OEC), Humanities, Social Science and Management Courses (HSC), Project & Internship (PI), etc.

Open Elective I Courses 6th Semester

S.N	Course Code	Name of Subject
1		Data Mining
2		Natural Language Processing
3		Deep Learning
4		Pattern Recognition
5		Machine Learning

Open Elective II courses 7th Semester

S.N	Course Code	Name of Subject
1		Cloud Computing
2		Ethical Hacking
3		Edge Computing
4		Virtualization Technology
5		Network Security

Open Elective III Courses 8th Semester

S.N	Course Code	Name of Subject
1		Internet of Things
2		Robotics and Automation
3		Automation Engineer
4		Embedded Systems
5		Crypto Currency Systems

Prepared By:

Asst Prof. Er. Bikash Bhattarai
Asst. Prof. Er. Shraddha KC
Asst. Prof. Er. Sushant Poudel

School of Engineering
Department of Software Engineering, Pokhara University, Nepal

Curriculum of UG Engineering/ Technology Programme

in

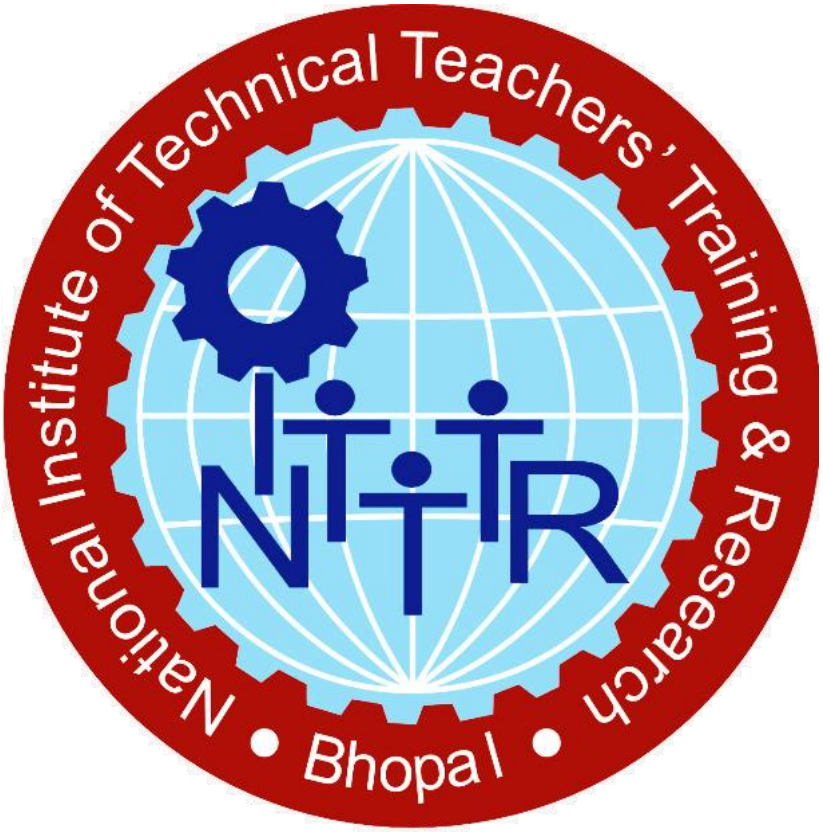
B.E Computer Engg./ Tech.

Mid-West University Graduate School of Engineering

May, 2026

083-520176 / info@mugser.edu.np
Birendranagar, Surkhet
mugser.edu.np

Curriculum Design and Development
In Collaboration with



Deemed to be University under Distinct Category

National Institute of Technical Teachers' Training & Research (NITTTR), Bhopal
(Deemed to be University under Distinct Category), Shamla Hills, Bhopal (M.P.) 462 002, Ministry of Education, Government of India
Website: http://www.nitttrbpl.ac.in

Contents

S. No. **Page Nos.**

Preface

VC of the Respective University

Acknowledgement

Bhopal
May, 2026

Project Coordinator
Curriculum Design &
Development Project,

1. **Introduction:** *(To be written by Programme Coordinator)*

2. **Approach for Scientific Design & Development of Outcome-Based Curriculum (OBC)** *(To be written by Project Coordinator)*

3. **Unique Features of the Curriculum Document:** *(To be written by Project Coordinator)*

4. **Vision & Mission Statements of the University:** *(To be written by Project Coordinator)*

5. **Vision & Mission Statements of the Department:** *(To be written by Programme Coordinator)*

6. **Programme Educational Objectives (PEOs):**
   - **PEO-1:** Graduates will establish successful careers by applying computer engineering knowledge and skills in diverse professional environments.
   - **PEO-2:** Graduates will engage in advanced studies, innovation, and research activities in computer engineering and rapidly evolving technological domains.
   - **PEO-3:** Graduates will take initiative as responsible leaders and entrepreneurs, contributing positively to society while considering ethical and community values.

7. **Programme Outcomes (POs): - As per NEC**

PO-1 **Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialization as specified in Knowledge and Attitude Profiles (KA1 to KA4) respectively to develop solutions to complex engineering problems.

PO-2 **Problem Analysis:** Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences with holistic considerations for sustainable development (KA1 to KA4).

PO-3 **Design/development of solutions:** Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole- life cost, net zero carbon as well as resources, cultural, societal, and environmental considerations as required (KA5)

PO-4 **Investigation:** Conduct investigations of complex engineering problems using research methods including research-based knowledge, design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions (KA8). Complex engineering problems are referred to as the problems:

- that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline as against problems given at the end of chapters in a typical textbook that can be solved using simple engineering theories and techniques;
- that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions;
- that require consideration of appropriate constraints / requirements not explicitly given in the problem statement such as cost, power requirement, durability,

product life, etc.;
- which need to be defined (modelled) within appropriate mathematical framework; and
- that often require use of modern computational concepts and tools, for example, in the design of an earthquake resistant building.

PO-5 **Modern Tool Usage:** Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering problems (KA2 and KA6)

PO-6 **The Engineer and the Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practices (KA7).

PO-7 **Ethics:** Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (KA9)

PO-8 **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multidisciplinary, face- to-face, remote and distributed settings (KA9)

PO-9 **Communication:** Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, making effective presentations, taking into account cultural, language, and learning differences.

PO-10 **Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO-11 **Lifelong learning:** Recognize the need for, and have the preparation and ability for:

- independent and life-long learning,
- adaptability to new and emerging technologies, and
- critical thinking in the broadest context of technological change (KA8)

Knowledge and Attitude Profiles (KAs)

KA-1 **Natural and social science:** A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

KA-2 **Mathematics:** Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

KA-3 **Engineering fundamentals:** A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

KA-4 **Specialist knowledge:** Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

KA-5 **Engineering design & operations:** Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

KA-6 **Engineering practice:** Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

KA-7 **Role of Engineering in society:** Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

KA-8 **Research literature:** Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

KA-9 **Ethics and conduct:** Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

8. Programme Specific Outcomes (PSOs):

PSO-1 Graduates will be able to design and develop software systems using modern programming tools.

PSO-2 Design, develop, and evaluate software solutions for real-world applications using programming languages along with software engineering concepts.

PSO-3 Graduates will be able to work in areas like AI, networking, cloud computing, and embedded systems.

9. Total Programme Structure with Teaching and Examination Scheme (Semester Wise): *(To be done by Project Coordinator)*

1.	**Title of UG Engg./ Tech. Programme**	:	B.E Computer Engineering
2.	**Duration of Programme**	:	Four Years
3.	**Entry Qualification**	:	+2 Science or Equivalent
4.	**Total Marks**	:	5625
5.	**Total Credits**	:	137
6.	**Total Number of Courses**	:	46
7.	**Qualification Awarded**		Bachelor of Engineering in Computer Engineering
	BE/ B.Tech.	:	Credits

8. Summary of Credits and Marks:

Year	Semester	Credits	Total Marks
Year -1	Semester -I	18	675
	Semester - II	18	775
Total		**36**	**1450**
Year -2	Semester -III	18	750
	Semester - IV	18	775
Total		**36**	**1525**
Year -3	Semester -V	18	850
	Semester- VI	16	625
Total		**34**	**1475**
Year -4	Semester -VII	17	650
	Semester - VIII	14	550
Total		**31**	**1200**
Grand Total		**137**	**5650**

10. Suggested Curriculum Component:

S. No.	Curriculum Components	Abbreviations	Number of Courses	Total Credits
1.	Applied Science Courses	ASC	5	16
2.	Engineering Science Courses	ESC	6	19
3.	Programme Core Courses	PCC	19	58
4.	Programme Elective Courses	PEC	2	6
5.	Open Electives Courses	OEC	2	6
6.	Humanities, Social Science and Management Courses	HSC	8	22
7.	Project, Internship & Industrial Training	PI	4	11
Total			46	137

UG Engg. /Tech. Programme in ……. **Semester - I**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		ASC	Basic Engineering Mathematics	3	3	1	-	4	40	60	-		100
		PCC	Computer Programming(C&C++)	4	3	2	3	8	40	60	50		150
		ASC	Engineering Physics	4	4	1	2	7	40	60	25		125
		ESC	Fundamentals of Electronics & Electrical Engineering	3	3	1	3	7	40	60	50		150
		PCC	Discrete Structure	3	3	1	-	4	40	60	-		100
		ESC	Computer Engineering Workshop	1	1	-	3	4	20	-	30		50
													675

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - II**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		ASC	Engineering Mathematics for Computer Science	3	3	1	-	4	40	60	-		100
		PCC	Python Programming	3	3	1	3	7	40	60	50		150
		ESC	Digital Logic	3	3	1	3	7	40	60	50		150
		ESC	Electronic Device and Circuits	3	3	1	3	7	40	60	50		150
		ASC	Probability and Statistics	3	3	1	-	4	40	60	-		100
		HSC	Information System Ethics	3	3	1	-	4	40	60	-		100
													750

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in …… **Semester - III**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		ASC	Discrete Mathematics	3	3	1	-	4	40	60	-		100
		HSC	Technical Writing and Presentation Skills	3	3	1	-	4	40	60	-		100
		HSC	Artificial Intelligence	3	3	1	-	4	40	60	-		100
		PCC	Foundation of Data Science	3	3	1	3	7	40	60	50		150
		HSC	Entrepreneurship Development and Start ups	3	3	1	-	4	40	60	-		100
		ESC	Microprocessors	3	3	1	3	7	40	60	50		150
													700

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - IV**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		ESC	Machine Learning	3	3	1	1.5	5.5	40	60	25		125
		ESC	Java Programming	4	4	1	1.5	6.5	40	60	25		125
		PCC	IoT and Embedded System	3	3	1	3	7	40	60	50		150
		PCC	Data structure and Algorithm	3	3	1	3	7	40	60	50		150
		PCC	Data Communication	3	3	1	1.5	5.5	40	60	25		125
		PCC	Operating System	3	3	1	1.5	5.5	40	60	25		125
													800

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - V**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		PCC	Generative AI & LLM	3	3	1	3	7	40	60	50		150
		PCC	Database Management System	3	3	1	3	7	40	60	50		150
		PCC	Web Application Programming	3	3	1	3	7	40	60	50		150
		PCC	Computer Organization and Architecture	3	3	1	1.5	5.5	40	60	25		125
		PCC	Computer Networks	3	3	1	3	7	40	60	50		150
		PEC	Elective I	3	3	1	1.5	5.5	40	60	25		125
													850

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in …….. Semester - VI

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		HSC	Engineering Economics & Financial Literacy	3	3	1	-	4	40	60	-		100
		HSC	Energy, Environment and Social Engineering	3	3	1		4	40	60			100
		PCC	Software Engineering	3	3	1	1.5	5.5	40	60	25		125
		PCC	Simulation and Modeling	3	3	1	1.5	5.5	40	60	25		125
		PI	Minor Project	1	-	-	-	-	-	-	50		50
		PEC	Elective II	3	3	1	1.5	5.5	40	60	25		125
													675

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - VII**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		PCC	Natural Language Processing and Text analysis	3	3	1	1.5	5.5	40	60	25		125
		PCC	Distributed and Cloud Computing	3	3	1	1.5	5.5	40	60	25		125
		HSC	ICT Project Management	3	3	1	-	4	40	60	-		100
		HSC	Energy, Environment and Social Engineering	3	3	-	-	3	40	60	-		100
		OEC	Professional Open Elective I	3	3	1	1.5	1.5	40	60	25		125
		PI	Capstone Project I	2	-	-	-	-	-	-	50		50
													625

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

UG Engg. /Tech. Programme in ……. **Semester - VIII**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
		PCC	Big Data Analytics	3	3	1	1.5	5.5	40	60	25		125
		OEC	Professional Open Elective II	3	3	1	1.5	5.5	40	60	25		125
		PI	Internship	4	-	-	-	-	-	-	100	50	150
		PI	Capstone Project II	4	-	-	-	-	-	-	100	50	150
													550

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

Programme Elective Courses

Elective Course Title	Category
Wireless Communication	PEC
RTOS (Real Time Operating System)	PEC
Drone Data Processing & Analysis	PEC
Wireless Sensor Network	PEC
Big Data	PEC
GPU Computing	PEC
Compiler Design	PEC
Digital Design with HDL	PEC
Blockchain	PEC
Mobile Programming	PEC
Linux Shell Programming	PEC

Open Elective Courses

Open Elective Subjects	Category
Introduction to Robotics	OEC
Cyber Law and Ethics	OEC
Innovation and Entrepreneurship	OEC

Prepared by:

Dr. Bharat Keshar Khanal
Dr. Bilip Bir Paudel

Mid West University, Nepal

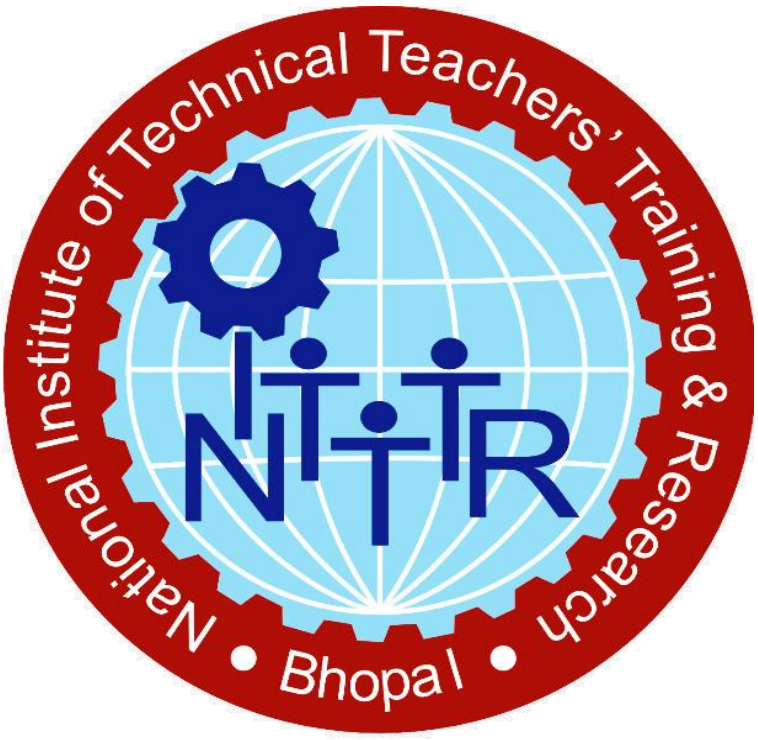
Curriculum
of
Bachelor in Computer Engineering Programme

Tribhuvan University

May, 2026

Kirtipur, Kathmandu
+977-1-4330346
Email: info@tu.edu.np
Website: https://tu.edu.np

Curriculum Design and Development
In Collaboration with



Deemed to be University under Distinct Category

National Institute of Technical Teachers' Training & Research (NITTTR), Bhopal
(Deemed to be University under Distinct Category), Shamla Hills, Bhopal (M.P.) 462 002, Ministry of Education, Government of India
Website: http://www.nitttrbpl.ac.in

Contents

S. No. **Page Nos.**

Preface

VC of the Respective University

Acknowledgement

Bhopal
May, 2026

Project Coordinator
Curriculum Design &
Development Project,

1. **Introduction:** *(To be written by Programme Coordinator)*

2. **Approach for Scientific Design & Development of Outcome-Based Curriculum (OBC)** *(To be written by Project Coordinator)*

3. **Unique Features of the Curriculum Document:** *(To be written by Project Coordinator)*

4. **Vision & Mission Statements of the University:** *(To be written by Project Coordinator)*

5. **Vision & Mission Statements of the Department:** *(To be written by Programme Coordinator)*

6. **Programme Educational Objectives (PEOs):** *(To be written by Programme Coordinator)*
   a. Graduates will be successful practitioners in computer engineering, hardware-software integration, system design, or related fields.
   b. Graduates will pursue professional growth, such as certifications or advanced degrees (Masters/PhD).
   c. Graduates will be able to build an entrepreneurial mindset that turns graduation into a launchpad for new ventures.

7. **Programme Outcomes (POs): - As per NEC**

PO-1 **Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialization as specified in Knowledge and Attitude Profiles (KA1 to KA4) respectively to develop solutions to complex engineering problems.

PO-2 **Problem Analysis:** Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences with holistic considerations for sustainable development (KA1 to KA4).

PO-3 **Design/development of solutions:** Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole- life cost, net zero carbon as well as resources, cultural, societal, and environmental considerations as required (KA5)

PO-4 **Investigation:** Conduct investigations of complex engineering problems using research methods including research-based knowledge, design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions (KA8). Complex engineering problems are referred to as the problems:

- that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline as against problems given at the end of chapters in a typical textbook that can be solved using simple engineering theories and techniques;
- that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions;
- that require consideration of appropriate constraints / requirements not explicitly given in the problem statement such as cost, power requirement, durability, product life, etc.;

- which need to be defined (modelled) within appropriate mathematical framework; and
- that often require use of modern computational concepts and tools, for example, in the design of an earthquake resistant building.

PO-5 **Modern Tool Usage:** Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering problems (KA2 and KA6)

PO-6 **The Engineer and the Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practices (KA7).

PO-7 **Ethics:** Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (KA9)

PO-8 **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multidisciplinary, face- to-face, remote and distributed settings (KA9)

PO-9 **Communication:** Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, making effective presentations, taking into account cultural, language, and learning differences.

PO-10 **Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO-11 **Lifelong learning:** Recognize the need for, and have the preparation and ability for:

- independent and life-long learning,
- adaptability to new and emerging technologies, and
- critical thinking in the broadest context of technological change (KA8)

Knowledge and Attitude Profiles (KAs)

KA-1 **Natural and social science:** A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

KA-2 **Mathematics:** Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

KA-3 **Engineering fundamentals:** A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

KA-4 **Specialist knowledge:** Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

KA-5 **Engineering design & operations:** Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

KA-6 **Engineering practice:** Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

KA-7 **Role of Engineering in society:** Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

KA-8 **Research literature:** Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

KA-9 **Ethics and conduct:** Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

8. Programme Specific Outcomes (PSOs):

PSO-1 Graduates will be able to design, develop and analyze computer based systems by integrating hardware components with software modules.

PSO-2 Graduates will be able to leverage machine learning and predictive analytics to address complex technical challenges.

PSO-3 Graduates will be capable of modeling and designing complex software systems to solve real world problems.

9. Total Programme Structure with Teaching and Examination Scheme (Semester Wise): *(To be done by Project Coordinator)*

1.	**Title of Engineering Program**	:	B.E. in Computer Engineering
2.	**Duration of Program**	:	Four Years
3.	**Entry Qualification**	:	+2 Science or equivalent
4.	**Total Marks**	:	5625
5.	**Total Credits**	:	137
6.	**Total Number of Courses**	:	46
7.	**Qualification Awarded**		B.E. in Computer Engineering
	BE/ B.Tech.	:	Credits

10. Summary of Credits and Marks:

Year	Semester	Credits	Total Marks
Year -1	Semester -I	18	675
	Semester - II	18	775
Total		**36**	**1450**
Year -2	Semester -III	18	750
	Semester - IV	18	775
Total		**36**	**1525**
Year -3	Semester -V	18	850
	Semester- VI	16	625
Total		**34**	**1475**
Year -4	Semester -VII	17	650
	Semester - VIII	14	550
Total		**31**	**1200**
Grand Total		**137**	5650

10. Suggested Curriculum Component :

S. No.	Course Category	Abbreviations	Number of Courses	Total Credits
1.	Applied Science Courses	ENSH	9	28
2.	Electronics Engineering Courses	ENEX	5	15
3.	Computer Engineering Courses	ENCT	23	68
4.	Computer Engineering Elective Courses	ENCT	2	6
5.	Open Electives Courses	MOEC	2	6
6.	Civil Engineering Courses	ENCE	1	3
7.	Project, Internship and Industrial Training	PI	4	11
Total			**46**	**137**

B.E. Programme in Computer Engineering **Semester - I**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	ENSH		Basic Engineering Mathematics	3	3	1	-	4	40	60	-		100
	ENCT		Computer Programming(C&C++)	4	3	2	3	8	40	60	50		150
	ENSH		Engineering Physics	4	4	1	2	7	40	60	25		125
	ENEX		Fundamentals of Electronics & Electrical Engineering	3	3	1	3	7	40	60	50		150
	ENCT		Discrete Structure	3	3	1	-	4	40	60	-		100
	ENCT		Computer Engineering Workshop	1	1	-	3	4	20	-	30		50

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

B.E. Programme in Computer Engineering **Semester - II**

Board of Studies	Course Code	Course Category	CourseTitle	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	ENSH		Engineering Maths for Computer Science	3	3	1	-	4	40	60	-		100
	ENCT		Python Programming	3	3	1	3	7	40	60	50		150
	ENEX		Digital Logic	3	3	1	3	7	40	60	50		150
	ENEX		Electronic Device and Circuits	3	3	1	3	7	40	60	50		150
	ENSH		Probability and Statistics	3	3	1	-	4	40	60	-		100
	ENSH		Applied Chemistry	3	3	1	3	7	40	60	25		125

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

B.E. Programme in Computer Engineering **Semester - III**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	ENSH		Discrete Mathematics	3	3	1	-	4	40	60	-		100
	ENSH		Technical Writing and Presentation Skills	3	3	1	-	4	40	60	-		100
	ENCT		Artificial Intelligence	3	3	1	3	7	40	60	50		150
	ENCT		Foundation of Data Science	3	3	1	3	7	40	60	50		150
	ENSH		Entrepreneurship Development and Start ups	3	3	1	-	4	40	60	-		100
	ENEX		Microprocessors	3	3	1	3	7	40	60	50		150

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

B.E. Programme in Computer Engineering **Semester - IV**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	ENCT		Machine Learning	3	3	1	1.5	5.5	40	60	25		125
	ENCT		Java Programming	3	3	1	1.5	5.5	40	60	25		125
	ENEX		IoT and Embedded System	3	3	1	3	7	40	60	50		150
	ENCT		Data structure and Algorithm	3	3	1	3	7	40	60	50		150
	ENSH		Professional Ethics & Values	3	3	1		4	40	60			100
	ENCT		Operating System	3	3	1	1.5	5.5	40	60	25		125

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

B.E. Programme in Computer Engineering **Semester - V**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	ENCT		Generative AI & LLM	3	3	1	3	7	40	60	50		150
	ENCT		Database Management System	3	3	1	3	7	40	60	50		150
	ENCT		Web Application Programming	3	3	1	3	7	40	60	50		150
	ENCT		Computer Organization and Architecture	3	3	1	1.5	5.5	40	60	25		125
	ENCT		Computer Networks	3	3	1	3	7	40	60	50		150
	ENCT		Elective I	3	3	1	1.5	5.5	40	60	25		125

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

B.E. Programme in Computer Engineering **Semester - VI**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	ENCE		Engineering Economics & Financial Literacy	3	3	1	-	4	40	60	-		100
	ENCT		Energy, Environment and Social Engineering	3	3	1		4	40	60			100
	ENCT		Software Engineering	3	3	1	1.5	5.5	40	60	25		125
	ENCT		Simulation and Modeling	3	3	1	1.5	5.5	40	60	25		125
	ENCT		Minor Project	1	-	-	-	-	-	-	50		50
	ENCT		Elective II	3	3	1	1.5	5.5	40	60	25		125

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

B.E. Programme in Computer Engineering **Semester - VII**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	ENCT		NLP and Text analysis	3	3	1	1.5	5.5	40	60	25		125
	ENCT		Distributed and Cloud Computing	3	3	1	1.5	5.5	40	60	25		125
	ENCT		ICT Project Management	3	3	1	-	4	40	60	-		100
	ENCT		Cybersecurity	3	3	1	1.5	5.5	40	60	25		125
	MOEC		Professional Open Elective I	3	3	1	1.5	1.5	40	60	25		125
	ENCT		Capstone Project I	2	-	-	-	-	-	-	50		50

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

B.E. Programme in Computer Engineering **Semester - VIII**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	ENCT		Big Data Analytics	3	3	1	1.5	5.5	40	60	25		125
	MOEC		Professional Open Elective II	3	3	1	1.5	5.5	40	60	25		125
	ENCT		Internship (8 weeks)	4	-	-	-	-	-	-	100	50	150
	ENCT		Capstone Project II	4	-	-	-	-	-	-	100	50	150

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Elective I

a. Data Mining and Warehousing
b. Image Processing and Pattern Recognition
c. Bio-Medical Instrumentation
d. Enterprise Application Design and Development
e. Geographical Information System
f. Remote Sensing
g. Drone Data Processing & Analysis

Elective II

a. Agile Software Development
b. Next Generation Networking with IPV6
c. Advanced Computer Architecture
d. Optical Fiber Communication System
e. Wireless Communication
f. Real Time Operating System
g. GPU Computing

Prepared by:

Prof Dr Subarna Shakya
Tribhuvan University, Nepal

Curriculum of UG Engineering Programme

in

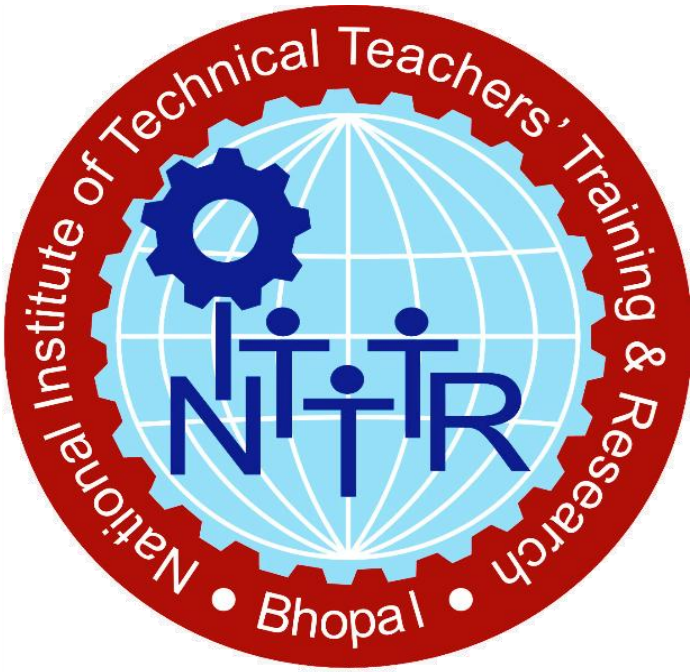
Computer Engineering

Far Western University

May, 2026

+977-099-520729
info@fwu.edu.np
Bheemdatta Municipality-18,Mahendranagar,Kanchanpur

Curriculum Design and Development
In Collaboration with



Deemed to be University under
Distinct Category

National Institute of Technical Teachers' Training & Research (NITTTR), Bhopal
(Deemed to be University under Distinct Category), Shamla Hills, Bhopal (M.P.) 462 002, Ministry of Education, Government of India
Website: http://www.nitttrbpl.ac.in

Contents

S. No. **Page Nos.**

Preface

VC of the Respective University

Acknowledgement

Bhopal
May, 2026

Project Coordinator
Curriculum Design &
Development Project,

1. **Introduction:** *(To be written by Programme Coordinator)*

2. **Approach for Scientific Design & Development of Outcome-Based Curriculum (OBC)** *(To be written by Project Coordinator)*

3. **Unique Features of the Curriculum Document:** *(To be written by Project Coordinator)*

4. **Vision & Mission Statements of the University:** *(To be written by Project Coordinator)*

5. **Vision & Mission Statements of the Department:** *(To be written by Programme Coordinator)*

6. **Programme Educational Objectives (PEOs):** *(To be written by Programme Coordinator)*

7. **Programme Outcomes (POs): - As per NEC**

PO-1 **Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialization as specified in Knowledge and Attitude Profiles (KA1 to KA4) respectively to develop solutions to complex engineering problems.

PO-2 **Problem Analysis:** Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences with holistic considerations for sustainable development (KA1 to KA4).

PO-3 **Design/development of solutions:** Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health and safety, whole- life cost, net zero carbon as well as resources, cultural, societal, and environmental considerations as required (KA5)

PO-4 **Investigation:** Conduct investigations of complex engineering problems using research methods including research-based knowledge, design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions (KA8). Complex engineering problems are referred to as the problems:

- that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline as against problems given at the end of chapters in a typical textbook that can be solved using simple engineering theories and techniques;
- that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions;
- that require consideration of appropriate constraints / requirements not explicitly given in the problem statement such as cost, power requirement, durability, product life, etc.;
- which need to be defined (modelled) within appropriate mathematical framework; and
- that often require use of modern computational concepts and tools, for example, in the design of an earthquake resistant building.

PO-5 **Modern Tool Usage:** Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering problems (KA2 and KA6)

PO-6 **The Engineer and the Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practices (KA7).

PO-7 **Ethics:** Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (KA9)

PO-8 **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multidisciplinary, face- to-face, remote and distributed settings (KA9)

PO-9 **Communication:** Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, making effective presentations, taking into account cultural, language, and learning differences.

PO-10 **Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO-11 **Lifelong learning:** Recognize the need for, and have the preparation and ability for:

- independent and life-long learning,
- adaptability to new and emerging technologies, and
- critical thinking in the broadest context of technological change (KA8)

Knowledge and Attitude Profiles (KAs)

KA-1 **Natural and social science:** A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

KA-2 **Mathematics:** Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

KA-3 **Engineering fundamentals:** A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

KA-4 **Specialist knowledge:** Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

KA-5 **Engineering design & operations:** Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

KA-6 **Engineering practice:** Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

KA-7 **Role of Engineering in society:** Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

KA-8 **Research literature:** Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

KA-9 **Ethics and conduct:** Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

8. Programme Specific Outcomes (PSOs):

Upon graduation, students will be able to:

- **PSO 1: Software and System Development**
  - Design, develop, and maintain complex software systems using principles of object-oriented programming, data structures, algorithms, and modern software engineering methodologies. This includes the ability to build web applications and manage large-scale databases.
- **PSO 2: Intelligent Systems and Data Science**
  - Apply mathematical foundations and computational theory to develop intelligent solutions involving Artificial Intelligence, Machine Learning, and Big Data analytics. Graduates will be able to model and simulate complex scenarios to derive data-driven insights.
- **PSO 3: Hardware-Software Integration and Embedded Systems**
  - Analyze and design integrated systems involving digital logic, microprocessors, and IoT (Internet of Things) devices. Graduates will demonstrate proficiency in interfacing hardware with software through a deep understanding of computer architecture and embedded system design.
- **PSO 4: Network Security and Infrastructure**
  - Design, implement, and secure robust communication networks and distributed cloud infrastructures. This includes applying cybersecurity protocols to protect information and managing the lifecycle of ICT projects within professional and ethical frameworks.

9. Total Programme Structure with Teaching and Examination Scheme (Semester Wise):

Year	Semester	Credits	Total Marks
Year -1	Semester -I	15	650
	Semester - II	18	750
Total		**33**	**1400**
Year -2	Semester -III	18	775
	Semester - IV	18	825
Total		36	1600
Year -3	Semester -V	18	800
	Semester- VI	18	750
Total		36	1550
Year -4	Semester -VII	17	700
	Semester - VIII	16	300
Total		33	1000
Grand Total		138	5550

10. Suggested Curriculum Component :

S. No.	Course Category	Abbreviations	Number of Courses	Total Credits
1.	Professional		3	7
2.	Programme Core Courses	CT	28	83
3.	Programme Elective Courses	PCC	3	9
4.	General Courses (Humanities, Science and basic engineering , Management Courses)		9	26
5.	Project, Internship and Industrial Training		3	11
Total				**136**

Bachelor of Engineering in Computer **Semester - I**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
Subject Committee	CT1101		Programming in C	3	3	1	2	6	40	60	20	30	150
	EL1102		Basic Electrical Engineering	3	3	1	1.5	5.5	40	60	10	15	125
	SH1103		Engineering Mathematics I	3	3	1		4	40	60			100
	SH1104		Engineering Physics	3	3	2	1.5	6.5	40	60	10	15	125
	AR1105		Engineering Drawing	2	1		3	4			40	60	100
	CT1106		Computer Engineering Workshop	1	1		1.5	2.5			40	60	100
				15	**14**	**5**	**9.5**	**28.5**	**160**	**240**	**100**	**150**	**650**

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

Bachelor of Engineering in Computer **Semester - II**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	EX1201		Electronic Devices and Circuits	3	3	1	1	5	40	60	10	15	125
	CT1202		Computational Mechanics	3	3	1	0	4	40	60			100
	SH1203		Engineering Mathematics II	3	3	1	0	4	40	60			100
	SH1204		Technical Communication	3	3	0	1	4	40	60	10	15	125
	CT1205		Object Oriented Programming	3	3	1	2	6	40	60	20	30	150
	EX1206		Digital Logic	3	3	1	2	6	40	60	20	30	150
				18	**18**	**5**	**6**	**29**	**240**	**360**	**60**	**90**	**750**

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

Bachelor of Engineering in Computer **Semester - III**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	CT2301		Computer Graphics	3	3	1	1.5	5.5	40	60	20	30	150
	CT2302		Theory of Computation	3	3	1		4	40	60			100
	SH2303		Applied Mathematics	3	3	1		4	40	60			100
	CT2304		Web Application Programming	3	3	1	2	6.0	40	60	20	30	150
	EX2305		Microprocessor	3	3	1	2	6	40	60	20	30	150
	EX2306		Electromagnetics	3	3	1	1	5	40	60	10	15	125
				18	**18**	**6**	**6.5**	**30.5**	**240**	**360**	**70**	**105**	**775**

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

Bachelor of Engineering in Computer **Semester - IV**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	CT2401		Fundamentals of Data Science	3	3	1	2	6	40	60	20	30	150
	CT2402		Data Structure and Algorithm	3	3	1	2	6	40	60	20	30	150
	CT2403		Numerical Computation	3	3	1	2	6	40	60	20	30	150
	CT2404		Computer Architecture and Design	3	3	1	1.5	5.5	40	60	10	15	125
	EX2405		Instrumentation	3	3	1	1.5	5.5	40	60	10	15	125
	EX2406		Communication System	3	3	1	1.5	5.5	40	60	10	15	125
				18	**18**	**6**	**10.5**	**34.5**	**240**	**360**	**90**	**135**	**825**

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

Bachelor of Engineering in Computer **Semester - V**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	CT3501		Software Engineering	3	3	1	1.5	5.5	40	60	10	15	125
	CT3502		Operating System	3	3	1	1.5	5.5	40	60	10	15	125
	CT3503		Computer Networks	3	3	1	1.5	5.5	40	60	10	15	125
	CT3504		Artificial Intelligence	3	3	1	2	6	40	60	20	30	150
	CT3505		Database Management System	3	3	1	2	6	40	60	20	30	150
	CT3506		Simulation and Modelling	3	3	1	1.5	5.5	40	60	10	15	125
				18	**18**	**6**	**10**	**34.0**	**240**	**360**	**80**	**120**	**800**

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

Bachelor of Engineering in Computer **Semester - VI**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	CT3601		ICT Project Management	3	3	1		4	40	60			100
	CT3602		Innovation and Design Seminar	2	0	0	2	2			40	60	100
	CT3603		Machine Learning	3	3	1	1.5	5.5	40	60	10	15	125
	CT3604		IOT and Embedded System	3	3	2	1.5	6.5	40	60	10	15	125
	CT3605		Engineering Economics	2	2	1		3	40	60			100
	CT36..		Elective-I	3	3	1	1	5	40	60			100
	CT3606		Minor Project	2	0	0	2	2			40	60	100
				18	**14**	**6**	**8.0**	**28.0**	**200**	**300**	**100**	**150**	**750**

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

Bachelor of Engineering in Computer **Semester - VII**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	CT4701		Digital Signal Analysis and Processing	3	3	1	1.5	5.5	40	60	10	**15**	125
	CT4702		Distributed and Cloud Computing	3	3	1	1.5	5.5	40	60	10	15	125
	CT4703		Big Data	3	3	1	1.5	5.5	40	60	10	15	125
	CT4704		Network and Cyber Security	3	3	1	1.5	5.5	40	60	10	15	125
	CT47..		Elective -II	3	3	1		4	40	60			100
	CT4706		Project I	2			2	2			40	60	100
				17	**15**	**5**	**8.0**	**28.0**	**200**	**300**	**80**	**120**	**700**

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

Bachelor of Engineering in Computer **Semester - VIII**

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	CT4801		Engineering Professional Practice & Society*	3	3	1		4	40	60			100
	CT48..		Elective –III*	3	3	1		4	40	60			
	CT4803		Project II	4			4	0			40	**60**	100
	CT4804		Internship **	6							40	60	100
				16	**6**	**2**		**8**	**80**	**120**	**80**	**120**	**300**

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

Prepared by:

Dr. Birodh Rijal
Far Western University, Nepal

Annexure 4

Sample Computer Engineering/ Software Engineering Course Curriculum Detailing

of

1. **Kathmandu University**
2. **Purbanchal University**
3. **Pokhra University**
4. **Mid Western University**
5. **Tribhuvan University**
6. **Far Western University**

Course Curriculum Detailing Format

A)	**Course Title: Data Structures and Algorithms**
B)	**Course Code: COMP 202**
C)	**Major Pre-requisite Course (s):** Fundamental knowledge on programming languages such as C, C++, and Python

D) Rationale:

Data Structures and Algorithms provide knowledge on different data structures such as Arrays, Pointers, Stack, and queues. Moreover, it provides theoretical and practical knowledge on Linked List, Trees and Graph. By learning this course, students will be familiar with sorting and searching algorithms. This course is significant to computer engineering students, in which they not only study algorithms but also study how to analyze different algorithms.

E) Course Outcomes (COs): After the completion of the course, teachers are expected to ensure the attainment of the following course outcomes by the learners.

Course Outcomes (COs)	Course Outcome Statements
CO1	Analyze the time and space complexity of algorithms using asymptotic notation.
CO2	Perform related operations to manipulate linear and non-linear data structures.
CO3	Implement appropriate search, and sorting algorithms to organize and retrieve data across different application scenarios efficiently.
CO4	Implement standard graph algorithms.

Course Curriculum Detailing Format

F) Course Articulation Matrix (CAM):

Course Outcomes (COs)	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)*		
	PO1 Engineering Knowledge	**PO2** Problem Analysis	**PO3** Design/ Development of Solutions	**PO4** Investigation	**PO5** Modern Tool Usage	**PO6** The Engineer and The Society	**PO7** Ethics	**PO8** Individual and Collaborative Team Work	**PO9** Communication	**PO10** Project Management and Finance	**PO11** Life-long Learning	**PSO1** Hardware	**PSO2** Software	**PSO3** AI/DA
CO1	3	3	3	2	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	2	1	-	-	-	-	-	-	-	3	-
CO3	3	3	3	2	1	-	-	1	1	2	2	-	3	-
CO4	3	3	3	2	1	-	-	2	2	2	2	-	3	-

Legend: High (3), Medium (2), Low (1) and No mapping (-)
Optional (*)

Course Curriculum Detailing Format

G) Teaching and Examination Scheme:

Subject Committee	Course Code	Course Category	Course Titles	Credits (C)	Teaching Scheme (Hours)	Examination Scheme (Marks)		Total Marks
						ISA	ESA	
DoCSE, KU	COMP 202	PCC	Data Structure and Algorithms	3	45	50	50	100

Legend:

L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

Course Curriculum Detailing Format

H) Course Curriculum Detailing: For attainment of course outcomes, the students are expected to perform/ undergo various activities through classroom, laboratories, workshops, any other workplace, term work, field sessions, self- learning assignment etc.

Unique features like green skills, SDGs, multidisciplinary aspects, Love for our own country, motivation for startups, societal connect, renewable energy, etc. are integrated appropriately in the course curriculum document.

I) CO(s) Wise Suggested Contents:

Mapped CO(s) Number	Contents
CO1	**Unit- 1.0:** 1.1 Introduction to Algorithms: Algorithm definition, Algorithm characteristics 1.2 Analysis of Algorithms: Time complexity, Space complexity, Asymptotic Analysis, Big-O notation, Theta notation, Omega notation, Time complexity analysis of iterative algorithms
CO2	**Unit- 2.0: Linear Data Structures** 1.1. Introduction to data structures 1.2. Abstract data types (ADT) 1.3. Stack Definition of stack, Stack operations: push, pop, isEmpty, top, peek, Terminologies: Stack overflow, stack underflow, Implementation using arrays and classes/structs: Representing stack, Implementing each operation of stack, Application of stack: Definition of Infix, prefix, and postfix expression, Evaluating a postfix expression, Converting an expression from Infix to Postfix 1.4. Queue Definition of queue, Queue operations- remove, insert, isEmpty, ADT Specification of Queue, Implementation of queue: Representing Queue, Implementing each operation of queue, Priority Queue, Ascending priority queue, Descending priority queue, Circular queue 1.5. Linked List Definition of linked list, Linked list operations: Inserting and removing nodes from a list, List traversal, Linked implementation of Stack, Linked implementation of Queue, Doubly Linked List, Circular Linked List
CO2, CO4	**Unit- 3.0: Non-linear Data Structures** 3.1 Tree Basic Terminologies: Root, Leaf, Right, Left, Parent, Child, Sibling, degree, height; Types of trees: binary tree, non-binary tree Binary tree: Types of binary tree: full binary tree, complete binary tree, almost complete binary tree; Basic operations in binary tree, Tree traversals (Pre-order, In-order and Post-order), Application of binary trees Binary Search Tree operations: Searching a node in Binary Search Tree, Insertion of a node in Binary Search Tree, Deletion of a node from Binary Search Tree

Course Curriculum Detailing Format

Mapped CO(s) Number	Contents
	3.2 Graph Definition of a graph, Types of graphs: connected/disconnected graphs, null graphs, complete graph Graph representation: Adjacency Matrix and List Representation, Operations on Graph: Vertex/edge insertion, vertex/edge deletion, Finding neighbours, Graph Traversal Spanning forests , Traversal Method (Depth First Search and Breadth First Search), Minimum Spanning Tree, Kruskal's Algorithm and Prim's Algorithm
CO3	**Unit- 4.0: Sorting Algorithms** 4.1 Selection Sort: Explanation, Time complexity analysis 4.2 Insertion Sort: Explanation, Time complexity analysis 4.3 Quick Sort: Explanation, Time complexity analysis 4.4 Merge Sort: Explanation, Time complexity analysis 4.5 Heap Sort: Explanation, Time complexity analysis
CO3	**Unit- 5.0: Searching Algorithms** 5.1 Searching 5.2 Search Techniques 5.3 Sequential Search 5.4 Binary Search 5.5 Hashed Search a. Hashing b. Introduction to Hashing c. HashFunction and hash tables d. Collision resolution techniques

J) CO(s) Wise Suggested List of Practicals:

Mapped CO(s) Number	Laboratory Experiment/ Practicals
CO1	1 Write an algorithm to find the sum of n numbers. Analyze its time complexity. 2 Implement the selection sort algorithm, and analyze its time complexity. 3 Implement the insertion sort algorithm, and analyze its time complexity.

Course Curriculum Detailing Format

Mapped CO(s) Number	Laboratory Experiment/ Practicals
	4 Implement the selection sort algorithm, and analyze its time complexity. 5
CO2, CO3	6 …….. 7 ……. 8 …….
CO3	9 ……. 10 ……..
CO4	11 …… 12 ……. 13 ……..

Note: Rubrics need to be prepared for effective performance by each student and their valid and reliable assessment.

K) Suggested In Semester Activities: This may include complex engineering problems, micro projects, seminar, self-learning, industrial/ field visit, assignment etc. It reinforces the development of spectrum of abilities needed for attainment of course outcomes. Complex engineering problems and micro projects need to be provided to learners to develop the problem solving, analytical, critical thinking, creative, investigative, exploring abilities in the learners and to prepare them as future ready work force. MOOCs, spoken tutorials, online educational resources etc. may be used for Self-Learning.

a. Suggested Complex Engineering Problems: NA

S. No.	Suggested Complex Engineering Problems
1.	
2.	
3.	
4.	
5.	

b. Suggested Micro Projects:

S. No.	Suggested Micro Projects
1.	Define a data structure called stack with suitable attributes. Implement different stack operations.

Course Curriculum Detailing Format

S. No.	Suggested Micro Projects
2.	Write a program that evaluates the postfix expression using stack data structure. The program should read a postfix expression consisting of digits and operators into a character array.
3.	Write a program that converts an ordinary infix arithmetic expression (assume a valid expression is entered) with single-digit integers.
4.	Define a data structure called queue with suitable attributes. Implement the different operations in the queue.
5.	Write a function that will read one line of input from the terminal. The input is supposed to consist of two parts separated by a colon ':'. As its result, your function should produce a single character.
6.	Implement the given tasks using a linked list and queue.
7.	Implement Quick Sort Algorithm.

c. Suggested Seminar Topics, Self- Learning Topics, Industrial Visits/Field Demonstration/Any other relevant activity, as applicable: NA

S. No.	Seminar Topics	Self- Learning Topics	Industrial Visits/ Field Demonstration	Any other Relevant Activity
1.				
2.				
3.				
4.				
5.				

Course Curriculum Detailing Format

L) Suggested Instructional/ Implementation Strategies: Different instructional/ learning/ implementation strategies may be used appropriately, as per the requirement of the level of learners and outcome to be achieved. Some of them are improved lecture, tutorial, case method, group discussion, industrial visits, industrial training, field trips, role play, live demonstrations in classrooms, lab, field, project work, self-learning, etc. Use of Information and Communications Technology (ICT) based teaching learning, blended or flipped mode, brainstorming, expert session, video clippings, Online Educational Resources (OER), MOOCs, etc. are the some of the suggestive methods/ strategies to be adopted appropriately.

The relevant instructional/ implementation strategies may be mentioned appropriately as per the requirement of CO.

CO Statement	Suggested Relevant Instructional/ Implementation Strategies	Suggested Required Resources
1. Analyze the time and space complexity of algorithms using asymptotic notation	- Basic algorithmic constructs, common data structures and Mathematical preliminaries (logarithms, exponentials, summations, recurrence relations) - Complexity measures - Count operations in pseudocode or real code - Simplify using asymptotic notation	
2. Perform related operations to manipulate linear and non-linear data structures.	- Choosing the right structure - Real-world scenarios by domain - Structure mechanics	
3. Implement appropriate search, and sorting algorithms to organize and	- Core algorithm taxonomy	

Course Curriculum Detailing Format

CO Statement	Suggested Relevant Instructional/ Implementation Strategies	Suggested Required Resources
retrieve data across different application scenarios efficiently.	- Choosing a sorting and searching algorithm - Data organization and retrieval - Algorithm mechanics and Performance measurement - Assessment rubrics	
4. Implement standard graph algorithms.	- Diagnostic assessment - Concrete → Representational → Abstract (CRA) - Comparative visualization - Decision matrices - Formative assessment - Technology integration	

M) Suggested Learning Resources:

a) Books

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Data Structures Using C and C++	Langsan, Augestein, amd Tenenbaum	
2.	Fundamentals of Data Strucutes in C++.	Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran	
3.			

Course Curriculum Detailing Format

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
4.			

b) Online Educational Resources (OER): NA

1) …….
2) …….
3) …….

c) Suggested List of Equipment: (For Class Size- 30): Desktop Computers- 30

S. No.	Name of the Equipment	Suggested Specifications	Remarks
1.	NA	NA	
2.			
3.			
4.			

N) (a) Course Curriculum Development Team (Kathmandu University)

S. No.	Name and Designation	E-mail Address
1.	Gajendra Sharma, Professor	gajendra.shamra@ku.edu.np
2.	Pankaj Raj Dawadi, Associate Professor	pdawadi@ku.edu.np
3.	Dhiraj Shrestha, Assistant Professor	dhiraj@ku.edu.np
4.	Rajani Chulyadyo, Assistant Professor	rajani.chulyadyo@ku.edu.np

(b) Course Curriculum Development Team (Academia & Experts)

S. No.	Name and Designation	E-mail Address
	NA	NA

****

Sample Course Curriculum Detailing Format

A)	**Course Title: Object Oriented Programming**
B)	**Course Code: BCE 2001**
C)	**Major Pre- requisite Course (s): Programming for Problem Solving**

D) Rationale:

Object Oriented Programming is essential for engineering students because it builds upon the basic programming knowledge gained in the first semester. It introduces important concepts such as classes, objects, inheritance, encapsulation, and polymorphism that improve logical and analytical thinking. OOP helps to develop modular, reusable, and maintainable software systems used in modern industries. It also serves as a foundation for advanced subjects like Software Engineering, Data Structures, AI, Web Development, and IoT. Learning OOP early prepares students for real-world problem solving and project-based learning. Since most modern programming languages support object-oriented concepts, early exposure increases students' industry readiness and technical competence.

E) Course Outcomes (COs): After the completion of the course, teachers are expected to ensure the attainment of following course outcomes by the learners.
Student will be able to:

Course Outcomes (COs)	Course Outcome Statements
CO1	Create classes and objects to represent real-world engineering problems.
CO2	Develop programs using for efficient memory utilization.
CO3	Apply inheritance to reuse existing code and reduce program redundancy.
CO4	Implement the concept of compile time and run time polymorphism.
CO5	Apply advanced concepts to develop modular, reusable, and reliable software applications.

Sample Course Curriculum Detailing Format

F) Course Articulation Matrix (CAM):

Course Outcomes (COs	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)*	
	PO1 Engineering Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Investigation	PO5 Modern Tool Usage	PO6 The Engineer and The Society	PO7 Ethics	PO8 Individual and Collaborative Team Work	PO9 Communication	PO10 Project Management and Finance	PO11 Life-long Learning	PSO1	PSO2
CO1	3	2	2	1	2	1	-	1	1	-	1	3	1
CO2	3	3	2	1	2	-	-	1	1	-	1	3	1
CO3	3	2	3	1	2	-	-	1	1	-	1	3	1
CO4	3	3	3	2	2	-	-	1	1	-	1	3	2
CO5	3	3	3	2	3	1	1	2	2	1	2	3	3

Legend: High (3), Medium (2), Low (1) and No mapping (-)
Optional (*)

G) Teaching and Examination Scheme:

Subject Committee/Faculty Board	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	BCE 2001	PCC	Object Oriented Programming	3	3	2	3	8	40	60	30	20	150

Legend:
L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

H) Course Curriculum Detailing: For attainment of course outcomes, the students are expected to perform/ undergo various activities through classroom, laboratories, workshops, any other workplace, term work, field sessions, self- learning assignment etc.

Unique features like green skills, SDGs, multidisciplinary aspects, Love for our own country, motivation

Sample Course Curriculum Detailing Format

for startups, societal connect, renewable energy, etc. are integrated appropriately in the course curriculum document.

I) CO(s) Wise Suggested Contents:

Mapped CO(s) Number	Contents
CO1	**Unit- 1.0:** 1.1 ……. 1.2 …… 1.3 ……. 1.4 ……..
CO2, CO3	**Unit- 2.0:** 2.1 ……. 2.2 …… 2.3 …….
CO3	**Unit- 3.0:** 3.1 …….. 3.2 …….. 3.3 ……. 3.4 …….
CO4	**Unit- 4.0:** 4.1 …….. 4.2 …….. 4.3 ……. 4.4 ……..
CO5	**Unit- 5.0:** 5.1 …… 5.2 ……. 5.3 ……. 5.4 ……

Sample Course Curriculum Detailing Format

J) CO(s) Wise Suggested List of Practicals:

Mapped CO(s) Number	Laboratory Experiment/ Practicals
CO1, CO2	1. Develop a module of Student/Employee Management System using classes, objects, constructors, destructors, member functions, and access specifiers.
CO1, CO3	2. Design a module of Library Management System implementing inheritance and code reusability concepts.
CO3, CO4	3. Develop a Shape or Vehicle Management application demonstrating function overloading, operator overloading, method overriding, and virtual functions.
CO5	4. Create a modular application using templates, namespaces, and exception handling for reliable software development.
CO1, CO2, CO3, CO4, CO5	5. Develop a real-world object-oriented application integrating classes, inheritance, polymorphism, templates, and exception handling.

Note: Rubrics need to be prepared for effective performance by each student and their valid and reliable assessment.

K) Suggested In Semester Activities: This may include complex engineering problems, micro projects, seminar, self-learning, industrial/ field visit, assignment etc. It reinforces the development of spectrum of abilities needed for attainment of course outcomes. Complex engineering problems and micro projects need to be provided to learners to develop the problem solving, analytical, critical thinking, creative, investigative, exploring abilities in the learners and to prepare them as future ready work force. MOOCs, spoken tutorials, online educational resources etc. may be used for Self-Learning.

a. Suggested Complex Engineering Problems:

S. No.	Suggested Complex Engineering Problems
1.	
2.	
3.	
4.	
5.	

b. Suggested Micro Projects:

Sample Course Curriculum Detailing Format

S. No.	Suggested Micro Projects
1.	
2.	
3.	
4.	
5.	

c. Suggested Seminar Topics, Self- Learning Topics, Industrial Visits/Field Demonstration/Any other relevant activity, as applicable:

S. No.	Seminar Topics	Self- Learning Topics	Industrial Visits/ Field Demonstration	Any other Relevant Activity
1.				
2.				
3.				
4.				
5.				

Sample Course Curriculum Detailing Format

L) Suggested Instructional/ Implementation Strategies: Different instructional/ learning/ implementation strategies may be used appropriately, as per the requirement of the level of learners and outcome to be achieved. Some of them are improved lecture, tutorial, case method, group discussion, industrial visits, industrial training, field trips, role play, live demonstrations in classrooms, lab, field, project work, self-learning, etc. Use of Information and Communications Technology (ICT) based teaching learning, blended or flipped mode, brainstorming, expert session, video clippings, Online Educational Resources (OER), MOOCs, etc. are the some of the suggestive methods/ strategies to be adopted appropriately.

The relevant instructional/ implementation strategies may be mentioned appropriately as per the requirement of CO.

CO Statement	Suggested Relevant Instructional/ Implementation Strategies	Suggested Required Resources

M) Suggested Learning Resources:

a) Books

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.			
2.			
3.			
4.			

b) Online Educational Resources (OER):

1) …….
2) …….
3) …….

c) Suggested List of Equipment: (For Class Size- 30)

S. No.	Name of the Equipment	Suggested Specifications	Remarks
1.			

Sample Course Curriculum Detailing Format

S. No.	Name of the Equipment	Suggested Specifications	Remarks
2.			
3.			
4.			

N) (a) Course Curriculum Development Team (Respective Universities)

S. No.	Name and Designation	E-mail Address
1.		
2.		

(b) Course Curriculum Development Team (Academia & Experts)

S. No.	Name and Designation	E-mail Address
1.		
2.		

****

Sample Course Curriculum Detailing Format

A)	**Course Title: Software Engineering**	
B)	**Course Code:**	
C)	**Major Pre- requisite Course (s):**	

D) Rationale:

E) Course Outcomes (COs): After the completion of the course, teachers are expected to ensure the attainment of following course outcomes by the learners.

Course Outcomes (COs)	Course Outcome Statements
CO1	Use the software process models of the Software Development Life Cycle (SDLC) for effective software development and management.
CO2	Develop appropriate software design models using UML diagrams and design principles.
CO3	Apply different planning and cost estimation techniques for a software product.
CO4	Evaluate the effectiveness of testing strategies to ensure defect-free and reliable software delivery.
CO5	Apply the various software configuration management to maintain consistency of software artifacts.

F) Course Articulation Matrix (CAM):

Course Outcomes (COs	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)*	
	PO1 Engineering Knowledge	**PO2** Problem Analysis	**PO3** Design/ Development of Solutions	**PO4** Investigation	**PO5** Modern Tool Usage	**PO6** The Engineer and The Society	**PO7** Ethics	**PO8** Individual and Collaborative Team Work	**PO9** Communication	**PO10** Project Management and Finance	**PO11** Life-long Learning	**PSO1**	**PSO2**
CO1	-	2	1	1	-	-	-	-	1	-	-	2	1
CO2	-	2	3	2	-	-	-	1	1	-	-	1	2
CO3	-	1	2	3	-	-	-	-	-	2	-	2	2
CO4	-	2	3	2	-	-	-	1	1	1	1	3	1
CO5	-	-	2	1	-	1	2	-	-	2	1	2	2

Sample Course Curriculum Detailing Format

Legend: High (3), Medium (2), Low (1) and No mapping (-)
Optional (*)

G) Teaching and Examination Scheme:

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	CMP 230		Software Engineering	3	3	1	2	6	35	35	15	15	100

Legend:
L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

H) Course Curriculum Detailing: For attainment of course outcomes, the students are expected to perform/ undergo various activities through classroom, laboratories, workshops, any other workplace, term work, field sessions, self- learning assignment etc.
Unique features like green skills, SDGs, multidisciplinary aspects, Love for our own country, motivation for startups, societal connect, renewable energy, etc. are integrated appropriately in the course curriculum document.

I) CO(s) Wise Suggested Contents:

Mapped CO(s) Number	Contents
CO1	**Unit- 1.0: Introduction to Software Engineering** 1.1 Fundamentals of Software Engineering (Definition and Need, Software Characteristics, Software Quality Attributes, Four P's of Software) 1.2 Software Process Models (Waterfall Model, Iterative Model, Prototyping Model, Spiral Model) 1.3 Introduction to Agile Development (Extreme Programming, Scrum) 1.4 Software Crisis and Myths

Sample Course Curriculum Detailing Format

Mapped CO(s) Number	Contents
CO2, CO3	**Unit- 2.0: Software Metrics, Software Project Planning** 2.1 Basic Terminologies of software metrics (Measures, Metrics and Indicators) 2.2 2.3
CO3	**Unit- 3.0:** 3.1 …….. 3.2 …….. 3.3 ……. 3.4 …….
CO4	**Unit- 4.0:** 4.1 …….. 4.2 …….. 4.3 ……. 4.4 ……..
CO5	**Unit- 5.0:** 5.1 …… 5.2 ……. 5.3 ……. 5.4 ……

J) CO(s) Wise Suggested List of Practicals:

Mapped CO(s) Number	Laboratory Experiment/ Practicals
CO1	1 ……. 2 …… 3 …….
CO2, CO3	4 …….. 5 ……. 6 …….
CO3	7 ……. 8 ……..
CO4	9 …… 10 ……. 11 ……..

Sample Course Curriculum Detailing Format

Mapped CO(s) Number	Laboratory Experiment/ Practicals
CO5	12 …….. 13 …….. 14 …….

Note: Rubrics need to be prepared for effective performance by each student and their valid and reliable assessment.

K) Suggested In Semester Activities: This may include complex engineering problems, micro projects, seminar, self-learning, industrial/ field visit, assignment etc. It reinforces the development of spectrum of abilities needed for attainment of course outcomes. Complex engineering problems and micro projects need to be provided to learners to develop the problem solving, analytical, critical thinking, creative, investigative, exploring abilities in the learners and to prepare them as future ready work force. MOOCs, spoken tutorials, online educational resources etc. may be used for Self-Learning.

a. Suggested Complex Engineering Problems:

S. No.	Suggested Complex Engineering Problems
1.	
2.	
3.	
4.	
5.	

b. Suggested Micro Projects:

S. No.	Suggested Micro Projects
1.	
2.	
3.	
4.	
5.	

c. Suggested Seminar Topics, Self- Learning Topics, Industrial Visits/Field Demonstration/Any other relevant activity, as applicable:

Sample Course Curriculum Detailing Format

S. No.	Seminar Topics	Self- Learning Topics	Industrial Visits/ Field Demonstration	Any other Relevant Activity
1.				
2.				
3.				
4.				
5.				

Sample Course Curriculum Detailing Format

L) Suggested Instructional/ Implementation Strategies: Different instructional/ learning/ implementation strategies may be used appropriately, as per the requirement of the level of learners and outcome to be achieved. Some of them are improved lecture, tutorial, case method, group discussion, industrial visits, industrial training, field trips, role play, live demonstrations in classrooms, lab, field, project work, self-learning, etc. Use of Information and Communications Technology (ICT) based teaching learning, blended or flipped mode, brainstorming, expert session, video clippings, Online Educational Resources (OER), MOOCs, etc. are the some of the suggestive methods/ strategies to be adopted appropriately.

The relevant instructional/ implementation strategies may be mentioned appropriately as per the requirement of CO.

CO Statement	Suggested Relevant Instructional/ Implementation Strategies	Suggested Required Resources

M) Suggested Learning Resources:

a) Books

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.			
2.			
3.			
4.			

b) Online Educational Resources (OER):

1) …….
2) …….
3) …….

c) Suggested List of Equipment: (For Class Size- 30)

S. No.	Name of the Equipment	Suggested Specifications	Remarks
1.			

Sample Course Curriculum Detailing Format

S. No.	Name of the Equipment	Suggested Specifications	Remarks
2.			
3.			
4.			

N) (a) Course Curriculum Development Team (Respective Universities)

S. No.	Name and Designation	E-mail Address
1.		
2.		

(b) Course Curriculum Development Team (Academia & Experts)

S. No.	Name and Designation	E-mail Address
1.		
2.		

****

Sample Course Curriculum Detailing Format

A)	**Course Title: Simulation & Modeling**
B)	**Course Code: ENCT**
C)	**Major Pre- requisite Course (s):** **Probability and Statistics** **Data Structure and algorithms**

D) Rationale: This course provides fundamental and advanced concepts of system modeling and simulation for analyzing real world engineering systems. It introduces students to continuous and discrete system simulation techniques, random variable generation, simulation output analysis, and simulation languages such as GPSS and SIMSCRIPT. The course enables learners to design, implement and evaluate simulation models for solving complex engineering and industrial problems efficiently.

E) Course Outcomes (COs): After the completion of the course, teachers are expected to ensure the attainment of following course outcomes by the learners.

Course Outcomes (COs)	Course Outcome Statements
CO1	Understand and explain fundamental concepts of systems, models, simulation and differentiate between continuous and discrete simulation approaches.
CO2	Generate random numbers and random variates from various probability distributions using appropriate techniques.
CO3	Develop and implement discrete-event and continuous simulation models using programming and simulation languages.
CO4	Perform model verification, validation and analyze simulation output data using statistical methods.
CO5	Design, simulate and evaluate real world engineering and industrial systems and interpret results for decision making.

F) Course Articulation Matrix (CAM):

Course Outcomes (COs	Programme Outcomes (POs)											Programme Specific Outcomes (PSOs)*	
	PO1 Engineering Knowledge	**PO2** Problem Analysis	**PO3** Design/ Development of Solutions	**PO4** Investigation	**PO5** Modern Tool Usage	**PO6** The Engineer and The Society	**PO7** Ethics	**PO8** Individual and Collaborative Team Work	**PO9** Communication	**PO10** Project Management and Finance	**PO11** Life-long Learning	**PSO1**	**PSO2**
CO1	3	2	1	2	2	-	-	-	-	-	-	2	1
CO2	2	3	2	2	3	-	-	-	1	-	-	3	2

Sample Course Curriculum Detailing Format

CO3	2	3	3	3	3	1	-	1	2	1	1	3	3
CO4	2	3	2	3	3	-	1	1	2	2	2	3	2
CO5	3	3	3	3	3	2	2	2	3	3	3	3	3

Legend: High (3), Medium (2), Low (1) and No mapping (-)
Optional (*)

G) Teaching and Examination Scheme:

Board of Studies	Course Code	Course Category	CourseTitles	Credits (C)	Teaching Scheme (Hours)				Examination Scheme (Marks)				Total Marks
					L	T	P	Total Hours (L+T+P)	Theory		Practical		
									ISA	ESA	ISA	ESA	
	ENCT		**Simulation and Modeling**	**3**	**3**	**1**	**1.5**	**5.5**	**40**	**60**	**25**		**125**

Legend:
L: Lecture, T: Tutorial, P: Practical/ Laboratory, ISA: In Semester Assessment for theory and practical, ESA: End Semester Assessment for theory and practical

Sample Course Category: Applied Science Courses (ASC), Engineering Science Courses (ESC), Professional Core Courses (PCC), Professional Core Elective (PCE), Multidisciplinary Open Electives Courses (MOEC), Humanities, Social Science and Management Courses (HSMC), Project & Internship (PI), etc.

H) Course Curriculum Detailing:

For attainment of course outcomes, the students are expected to perform/ undergo various activities through classroom, laboratories, workshops, any other workplace, term work, field sessions, self- learning assignment etc.

Unique features like green skills, SDGs, multidisciplinary aspects, Love for our own country, motivation for startups, societal connect, renewable energy, etc. are integrated appropriately in the course curriculum document.

I) CO(s) Wise Suggested Contents:

Mapped CO(s) Number	Contents
CO1	**Unit- 1.0: Introduction to Modeling and Simulation** 1.1 System and System Environment Concepts 1.2 Components of System 1.3 Discrete and Continuous System 1.4 System simulation 1.5 Model of a System 1.6 Types of Models 1.7 Use of Differential and Partial differential equations in Modeling 1.8 Advantages, Disadvantages and Limitations of simulation 1.9 Application Areas 1.10 Phases in Simulation Study 1.11 Monte Carlo Simulation
CO2, CO3	**Unit- 2.0: Simulation of Continuous System** 2.1 Continuous System Models 2.2 Analog Computers 2.3 Analog Methods 2.4 Hybrid Simulation 2.5 Digital-Analog Simulators

Sample Course Curriculum Detailing Format

Mapped CO(s) Number	Contents
	2.6 Feedback Systems
CO3	**Unit- 3.0: Simulation of Discrete System** 3.1 Discrete events 3.2 Representation of time 3.3 Generation of arrival patterns 3.4 Simulation of a telephone system 3.5 Delay calls 3.6 Simulation of programming tasks 3.7 Gathering statistics 3.8 Counters and summary statics 3.9 Measuring utilization and occupancy 3.10 Recording distribution and transit times 3.11 Discrete simulation languages
CO4	**Unit- 4.0: Analysis of Simulation Output** 4.1 Estimation methods 4.2 Simulation run statistics 4.3 Replication of runs 4.4 Elimination of internal bias
CO5	**Unit- 5.0: Simulation Languages** 5.1 Types of simulation languages 5.2 Discrete systems modeling and simulation with GPSS 5.3 Resources in GPSS 5.4 GPSS programs, applications 5.5 Structural data and control statements 5.6 SIMSCRIPT programs

J) CO(s) Wise Suggested List of Practicals:

Mapped CO(s) Number	Laboratory Experiment/ Practicals
CO1	1 Study of different types of simulation with examples. 2 Implementation of basic Monte Carlo Simulation.
CO2, CO3	3 Generation of random numbers and testing 4 Simulation of single-server and multi-server queuing system
CO3	5 Simulation of Telephone system
CO4	6 Model verification and validation exercises 7 Statistical analysis of simulation output

Sample Course Curriculum Detailing Format

Mapped CO(s) Number	Laboratory Experiment/ Practicals
CO5	8 Simulation of real world systems 9 GPSS and SIMSCRIPT program for basic queuing model

Note: Rubrics need to be prepared for effective performance by each student and their valid and reliable assessment.

K) Suggested In Semester Activities: This may include complex engineering problems, micro projects, seminar, self-learning, industrial/ field visit, assignment etc. It reinforces the development of spectrum of abilities needed for attainment of course outcomes. Complex engineering problems and micro projects need to be provided to learners to develop the problem solving, analytical, critical thinking, creative, investigative, exploring abilities in the learners and to prepare them as future ready work force. MOOCs, spoken tutorials, online educational resources etc. may be used for Self-Learning.

a. Suggested Complex Engineering Problems:

S. No.	Suggested Complex Engineering Problems
1.	Model and analyze a hospital emergency department queuing system under varying loads.
2.	Simulate inventory management for a supply chain with stochastic demand.
3.	Performance evaluation of a computer network under different protocols/loads.
4.	Simulation-based optimization of renewable energy system(e.g., solar/wind integration)
5.	

b. Suggested Micro Projects:

S. No.	Suggested Micro Projects
1.	GPSS-based simulation of a supermarket checkout system.
2.	Discrete-event simulation of a bank or call center.
3.	Continuous simulation of a population or epidemic mode.
4.	
5.	

c. Suggested Seminar Topics, Self- Learning Topics, Industrial Visits/Field Demonstration/Any other relevant activity, as applicable:

Sample Course Curriculum Detailing Format

S. No.	Seminar Topics	Self- Learning Topics	Industrial Visits/ Field Demonstration	Any other Relevant Activity
1.	Application of simulation in industry	Advanced variance reduction techniques	Manufacturing Plant	
2.	Agent-Based Modeling	Simulation software comparison	Hospital/ Logistics	
3.	Simulation for sustainable development	Validation Techniques		
4.	AI Integration with simulation	Experimental Design		
5.	Real-Time Simulation	Monte Carlo in Engineering		

Sample Course Curriculum Detailing Format

L) Suggested Instructional/ Implementation Strategies: Different instructional/ learning/ implementation strategies may be used appropriately, as per the requirement of the level of learners and outcome to be achieved. Some of them are improved lecture, tutorial, case method, group discussion, industrial visits, industrial training, field trips, role play, live demonstrations in classrooms, lab, field, project work, self-learning, etc. Use of Information and Communications Technology (ICT) based teaching learning, blended or flipped mode, brainstorming, expert session, video clippings, Online Educational Resources (OER), MOOCs, etc. are the some of the suggestive methods/ strategies to be adopted appropriately.

The relevant instructional/ implementation strategies may be mentioned appropriately as per the requirement of CO.

CO Statement	Suggested Relevant Instructional/ Implementation Strategies	Suggested Required Resources
CO1	Lectures, Case Discussions	Slides, Reference books
CO2-CO3	Lab Sessions, Programming, Tutorials, Live Coding	Computer Lab with Python, GPSS Simulator
CO4	Group problem solving, Data Analysis workshop	Statistical Software(R/Python)
CO5	Project based learning, Industrial Case studies	Simulation Software

M) Suggested Learning Resources:

a) Books

S. No.	Titles	Author(s)	Publisher and Edition with ISBN
1.	Computer Aided Modeling and Simulation	J. A. Spriest and G.C Vansteenkiste	Academic Press
2.	System Simulation	G. Gorden	Pretice Hall of India
3.	Simulation Modeling and Analyis	A.M. Law and W.D. Kelton	McGraw Hill
4.			

b) Online Educational Resources (OER):

1) …….
2) …….
3) …….

Sample Course Curriculum Detailing Format

c) Suggested List of Equipment: (For Class Size- 30)C

S. No.	Name of the Equipment	Suggested Specifications	Remarks
1.	Computer Systems	i5/i7, 16GB RAM, Python installed	30 no.s
2.	Simulation Software	GPSS, Python	Licensed/ Open source
3.	Project/Smart Board	Standard	1
4.	Statistical Analysis Tools	R/Python with libraries	Pre-installed

N) (a) Course Curriculum Development Team (Respective Universities)

S. No.	Name and Designation	E-mail Address
1.	Kunjan Amatya, Associate Professor	amatya.kunjan@gmail.com
2.		

(b) Course Curriculum Development Team (Academia & Experts)

S. No.	Name and Designation	E-mail Address
1.		
2.		

****

राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान, भोपाल (म.प्र.)

NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND RESEARCH, BHOPAL (M.P.)

(A Deemed to be university under distinct category)

MINISTRY OF EDUCATION, GOVERNMENT OF INDIA
SHANTI MARG, SHAMLA HILLS
BHOPAL - 462002, MADHYA PRADESH - INDIA
Tel. : +91(755) 2661600 - 602, 607 - 608,
Email ID: director@nitttrbpl.ac.in

Follow us: twitter.com/nitttrbpl facebook.com/nitttrbhopalofficial instagram.com/nitttrbhopal www.nitttrbpl.ac.in