BAGMATI UNIVERSITY

FACULTY OF SCIENCE AND TECHNOLOGY

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BACHELOR OF SCIENCE IN

COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

B.Sc. CSIT

COURSE OF STUDY

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Outcome-Based Education | Project-Based Learning | Research-Integrated | Industry-Connected

Four Years | Eight Semesters | 131 Credits

Effective from Academic Year - 2083

Prepared by

Computer Science and Information Technology Subject Committee

Faculty of Science and Technology

Bagmati University

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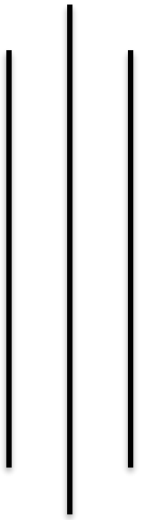
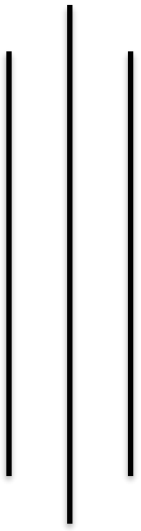


Course of Study

Bachelor of Science in Computer Science and Information Technology

B.Sc. CSIT



Curriculum and Academic Framework

131 Credits

Program Introduction

The Bachelor of Science in Computer Science and Information Technology (B.Sc. CSIT) is a four-year, eight-semester undergraduate program designed to develop strong foundations in computing, mathematics, scientific reasoning and information technology. The curriculum integrates theory with laboratory practice, projects, research, professional communication and industry exposure so that graduates can understand computing systems and build reliable solutions for real-world problems.

The program begins with programming, digital logic, mathematics, statistics and applied physics. It then advances through data structures, algorithms, computer architecture, operating systems, databases, web technologies, networks, software engineering, artificial intelligence and scientific computing. In the later semesters, students study data science, machine learning, cybersecurity, cloud and distributed computing, compiler construction, big data analytics and entrepreneurship.

Learning is progressively applied through Project I, Major Project, literature review research and seminar activities, and a six-credit industry internship. These experiences enable students to integrate technical knowledge, investigate problems, communicate evidence, work in teams and deliver computing products in professional settings.

Students complete three elective courses: one in Semester VII and two in Semester VIII. These electives enable students to pursue focused study in network and system security, distributed and wireless systems, the Internet of Things, software quality and development, data and database administration, image processing and computer vision, geospatial technology, automation and robotics, human-computer interaction, IT project management, simulation, blockchain, and quantum computing, while maintaining a common and rigorous CSIT core.

Program Objectives

- Provide strong foundations in computer science, information technology, mathematics, statistics and computational science.
- Develop computational thinking, algorithmic problem-solving, programming and software-development competencies.
- Develop understanding of the theoretical foundations of computation, including algorithms, discrete structures, formal models and computational reasoning.

- Provide a functional understanding of computer systems from digital logic and processor organization to operating systems, networks, cloud systems and emerging computing platforms.
- Develop the ability to design, implement, test, evaluate and maintain reliable software and computing systems.
- Prepare students for contemporary areas including artificial intelligence, machine learning, data science, cybersecurity, cloud computing, distributed systems and emerging computing technologies.
- Develop mathematical and scientific reasoning through calculus, linear algebra, multivariable calculus, differential equations, statistics, numerical computing and applied physics.
- Develop competence in research, experimentation, technical communication, evidence-based problem solving and project work.
- Provide industry-connected learning through project-based activities and industry internship.
- Develop awareness of professional ethics, privacy, security, societal impact, sustainability and responsible computing.
- Prepare graduates for professional employment, entrepreneurship, postgraduate study, research and innovation in national and international contexts.
- Develop lifelong-learning capacity so graduates can adapt to rapidly changing computing technologies and professional environments.

Outcome-Based Education and Project-Based Learning

Bagmati University adopts an Outcome-Based Education (OBE) approach for the B.Sc. CSIT program. Teaching, learning and assessment shall be organized around clearly defined and measurable learning outcomes. Course specifications shall normally include prerequisites, course objectives, Course Outcomes (COs), Bloom's Taxonomy levels, theory and laboratory hours, detailed unit content, assessment methods and Course Outcome CO-Program Outcome (PO) mapping.

Project-Based Learning (PBL) is integrated throughout the program rather than being confined to a single final-year project. Laboratory activities, programming assignments, mini-projects, design

tasks, data analysis, research activities and interdisciplinary applications shall be used to connect theoretical knowledge with computing problems.

The learning process shall advance from guided foundational study to independent design, experimentation, research and professional practice. Project I, Literature Review Research and Seminar, the Major Project and the Industry Internship shall enable students to integrate and apply knowledge and skills acquired across the program.

Program Outcomes

PO	Title	Program Outcome
PO1	Computing Knowledge	Apply computing, mathematical and scientific foundations to solve computing problems.
PO2	Problem Analysis	Identify, formulate and analyze complex computing problems using appropriate principles and evidence.
PO3	Design and Development	Design and develop computing solutions, systems and software that meet specified requirements.
PO4	Investigation and Research	Conduct systematic investigation, experimentation and interpretation of results.
PO5	Modern Tool Usage	Select and use contemporary computing, software, scientific and analytical tools appropriately.
PO6	Computing, Society and Sustainability	Evaluate computing solutions in societal, environmental and sustainability contexts.
PO7	Ethics and Professional Responsibility	Apply ethical, legal, security, privacy and professional principles.
PO8	Individual and Team Work	Work effectively independently and as a member or leader of multidisciplinary teams.
PO9	Communication	Communicate technical information effectively through written, oral and visual forms.
PO10	Project Management	Apply project, management principles in computing practice.
PO11	Lifelong Learning	Acquire and apply new knowledge independently in rapidly changing computing environments.

PO12	Innovation and Entrepreneurship	Apply creative, computational and entrepreneurial thinking to develop or improve innovative computing products, services and solutions.

Eligibility Condition for Admission

A candidate seeking admission to the B.Sc. CSIT program shall meet the admission requirements prescribed by Bagmati University. In general, the candidate shall:

- Have successfully completed Grade 12, 10+2, A-Level, Diploma or an equivalent qualification recognized by Bagmati University.
- Have studied the prerequisite subjects prescribed by the University for admission to the B.Sc. CSIT program.
- Meet the minimum academic achievement requirements prescribed by the University.
- Pass the entrance examination or other admission assessment prescribed by Bagmati University, where applicable.
- Fulfill all application, equivalence and admission procedures required by Bagmati University.
- The detailed eligibility thresholds, entrance requirements and equivalence provisions shall be governed by the prevailing admission regulations of Bagmati University.

Course Duration

The entire program is of eight semesters distributed over four academic years. Each semester shall include academic instruction, laboratory/practical work, continuous assessment and semester-end evaluation according to the academic calendar and regulations of Bagmati University.

Hours of Instruction

- For a 3-credit theory and laboratory course, the normal contact pattern shall include 3 lecture hours and appropriate laboratory/practical hours per week as specified in the approved course specification.
- For a 3-credit theory-oriented course, 3 lecture hours with appropriate tutorial/problem-solving or guided learning activities shall be provided.
- Project, seminar, research and internship courses shall use supervised learning hours and assessment requirements appropriate to the nature of the activity.

- Laboratory-intensive courses shall include sufficient supervised practical work to demonstrate achievement of the relevant Course Outcomes.

Evaluation

The B.Sc. CSIT program shall use continuous internal assessment and semester-end evaluation. For theory-oriented courses, the normal evaluation weightage shall be 40% internal assessment and 60% semester-end examination. For courses containing a separately assessed laboratory or practical component, the normal evaluation weightage shall be 20% internal assessment, 20% external practical examination and 60% semester-end theory examination, unless otherwise specified in the approved course specification or prevailing University regulation. The external practical examination shall be conducted by an external examiner appointed by Bagmati University.

- Internal assessment may include attendances, quizzes, assignments, programming tasks, laboratory performance, practical reports, case studies, presentations, projects and mid-semester examinations.
- Courses containing laboratory or practical work shall explicitly assess practical competence in accordance with the evaluation framework prescribed by the University.
- Project, research, seminar and internship courses shall be evaluated using appropriate combinations of proposal/design, implementation, report or thesis, presentation, demonstration, viva voce, supervisor evaluation and external evaluation.
- Assessment shall measure appropriate Bloom's Taxonomy levels and shall not be limited to recall-based examination.
- Students shall maintain a minimum attendance of 80% in each course to be eligible for the semester-end examination.

Grading System

The grade awarded to each student in each course is based on his/her overall performance through internal evaluation and end-semester examination. Several evaluation criteria are used for the continuous internal evaluation. External evaluation is solely based on final examination conducted by the University. The grade in each course is assigned using a letter grade that indicates the overall performance of each student in each course. Each letter grade has its corresponding grading scale, grade point, and performance remarks as shown in the table below.

Letter Grade	Grading Scale	Grade Point	Performance Remarks
A	90 – 100	4	Outstanding
A-	80 – less than 90	3.7	Excellent
B+	70 – less than 80	3.3	Very Good
B	60 – less than 70	3	Good
B-	50 – less than 60	2.7	Satisfactory
C	40 – less than 50	2.3	Pass
F	0 – less than 40	0	Fail

The performance of each student in each semester shall be evaluated in terms of Semester Grade Point Average (SGPA) which is the grade point average for the semester. SGPA is calculated as

$$SGPA = \frac{Total\ Grade\ Points\ earned\ in\ a\ semester}{Total\ number\ of\ credits\ earned\ in\ the\ semester}$$

The cumulative grade point average (CGPA) is the grade point average for all completed semesters. CGPA is calculated as

$$CGPA = \frac{Total\ Grade\ Points\ earned}{Total\ number\ of\ credits\ completed}$$

Final Examination

Bagmati University shall conduct semester-end examinations in accordance with its prevailing examination regulations. Theory-oriented courses shall include a semester-end written examination carrying 60% of the total marks. Courses with a separately assessed laboratory or practical component shall additionally include an external practical examination carrying 20% of the total marks, conducted by an external examiner appointed by Bagmati University. Project, research, seminar and internship courses shall be evaluated using assessment mechanisms approved for the respective course, which may include reports, presentations, demonstrations, viva voce and supervisor or external evaluation.

Course Structure

Semester	Credits
I	15
II	15
III	15
IV	18
V	18
VI	16
VII	18
VIII	15
Total	130

Coding Groups

S.N	Course Name	Course Code
1	Computer Science Course	CSC
2	Information Technology Course	ITC
3	Applied Science Course	ASC
4	Humanity Social Science and Management course	HSC

Semester I

Code	Subject	Cr.
CSC101	Foundations of Computing and Information Technology	3
ITC102	Structured Programming in C	3
CSC103	Digital Logic	3
ASC104	Calculus and Analytical Methods	3
ASC105	Applied Physics	3
	Semester Total	**15**

Semester II

Code	Subject	Cr.
ITC151	Object-Oriented Programming with Java	3
CSC152	Discrete Structures for Computer Science	3
CSC153	Microprocessors and Computer Architecture	3
ASC154	Linear Algebra and Optimization	3
ASC155	Probability and Statistics	3
	Semester Total	**15**

Semester III

Code	Subject	Cr.
CSC201	Data Structure and Algorithms	3
CSC202	Numerical Methods for Computing	3
ITC203	Web Programming	3
CSC204	Database Management System	3
ASC205	Statistical Modeling	3
	Semester Total	**15**

Semester IV

Code	Subject	Cr.
CSC251	Theory of Computation	3
CSC253	Operating Systems	3
CSC254	Artificial Intelligence	3
CSC252	Software Engineering	3
ITC255	Technical Writing and Communications	3
CSC256	Apprentice Project	3
	Semester Total	**18**

Semester V

Code	Subject	Cr.
CSC301	Design and Analysis of Algorithms	3
ITC302	E-Commerce and Digital Governance	3
CSC303	Cryptography	3
CSC304	Computer Graphics	3
CSC305	Data Communications and Computer Networks	3
ITC306	Python Programming	3
	Semester Total	**18**

Semester VI

Code	Subject	Cr.
CSC351	Compiler Design	3
CSC352	Data Science and Engineering	3
CSC353	Cloud Computing and DevOps	3
CSC354	Machine Learning	3
HSC355	Principles of Management and Entrepreneurship	3
ITC356	Literature Review Research and Seminar	1
	Semester Total	**16**

Semester VII

Code	Subject	Cr.
CSC401	Cybersecurity	3
CSC402	Big Data Analytics and Mining	3
CSC403	Natural Language Processing	3
CSC404	Major Project	3
ITC405	Society and Ethics in Computing	3
	Elective I	3
	Semester Total	**18**

Elective Courses (Any One for Semester VII)

1. Network Security (CSC425)
2. Internet of Things (ITC526)
3. Software Testing and Quality Assurance (CSC527)
4. Programming in Go (ITC528)
5. Image Processing and Computer Vision (CSC529)
6. Human-Computer Interaction (CSC530)
7. Health Informatics (ITC531)

Semester VIII

Code	Subject	Cr.
CSIT451	Deep Learning and Generative AI	3
CSIT452	Industry Internship	6
	Elective II	3
	Elective III	3
	Semester Total	**15**

Elective Courses (Any Two for Semester VIII)

1. Scalable Distributed Systems (CSC475)
2. Geospatial Technology (CSC476)
3. Network and System Administration (CSC477)
4. Automation and Robotics (ITCC478)
5. Cross-Platform App Development (ITC479)
6. IT Project Management (ITC480)
7. Wireless Networking (ITC481)
8. Database Administration (ITC482)
9. Quantum Computing (CSC483)
10. Blockchain Technology (ITC484)
11. Simulation and Modeling (CSC485)
12. Ethical Hacking (ITC486)

Syllabus Discussion Panel

Course structure reviewed and discussed by a multidisciplinary panel comprising senior university administrators, professors, researchers, computing specialists, education experts, and faculty representatives. The discussion focused on academic standards, curriculum relevance, course progression, interdisciplinary balance, emerging technologies, practical competencies, and alignment with contemporary higher-education and industry requirements.

- Prof. Dr. Shankar Khanal, Dean IOST, TU
- Prof. Dr. Tanka Nath Dhamala, IOST TU
- Associate Prof. Nawaraj Paudel, IOST TU
- Assistant Prof. Jagdish Bhatta, IOST TU
- Assistant Prof. Loknath Regmi, IOE Pulchowk
- Dr. Tej Bahadur Sahi, Scientist, Postdoctoral Research Fellow, School of Computer Science, Queensland University of Technology, Australia
- Ashok Pant, Academician, AI researcher, and technology entrepreneur; Co-founder and Chief Technology Officer of Treeleaf.AI and Anydone.
- Sushant Paudel, Faculty BIT/CSIT, Kapan Campus, Bagmati University
- Ramesh Singh Saud, Faculty BIT/CSIT Kapan Campus, Bagmati University
- Kishor Lamichhane, Faculty BIT/CSIT Kapan Campus, Bagmati University
- Dilli Ram Adhikari, Faculty B.Ed., Kapan Campus, Bagmati University
- Sameer Gautam, Faculty BIT, Hetauda Campus, Bagmati University
- Er. Anil Kumar Gupta, Faculty BIT, Hetauda Campus, Bagmati University