

STRATEGIC PLAN

(2023-2028)



Central Department of Mathematics

Institute of Science and Technology

Tribhuvan University

Kirtipur, Kathmandu

2023

PREFACE

The Department of Mathematics was established under the Institute of Science and Technology (IoST), Tribhuvan University (TU). Its objectives include providing postgraduate education, producing highly skilled mathematicians, conducting research in pure and applied mathematics, and advising the Nepal Government on mathematics needs and policy formation. The department has made significant progress in teaching and research, upgrading facilities such as the library and computational lab, revising curricula for Master's and M.Phil. Programs and addressing the decline in student enrollment. To increase intake in M.A/M.Sc. Mathematics, various mathematical activities are being conducted in collaboration with the Nepal Mathematical Society.

The vision of the Central Department of Mathematics Strategic Plan 2023-2027 is to become an internationally renowned autonomous institute, known for its excellence in mathematics education and research. The department aims to foster innovative teaching and research methods, promote knowledge dissemination in mathematics, and cultivate an environment where students can develop their mathematical skills and understand its applications in various disciplines. This plan aligns with Tribhuvan University's Vision 2030, emphasizing equity, inclusive education, updated curriculum, quality pedagogy, research-oriented learning, performance-based incentives, transparency, accountability, collaboration, resource generation, and sustainability.

The strategic plan of the Central Department of Mathematics (CDM) focuses on four main areas: Curriculum and Education, Research and Innovation, Faculties and Infrastructure, and Visibility and Branding. The department aims to produce graduates equipped with lifelong learning skills, critical thinking abilities, strong ethical values, and professional competencies. This will be achieved through capacity building for staff, enhancing teaching, learning, and research infrastructure, and maintaining a high-quality and secure environment. The department strives to foster a vibrant, inclusive, and diverse community of faculty, staff, and students.

This strategic plan acknowledges the national needs, opportunities, and the evolving challenges posed by changing knowledge and society. It will serve as a guiding framework for the department to deliver quality education over the next five years (2023-2027).

Head of Department

Central Department of Mathematics

Date: June 28, 2023

TABLE OF CONTENTS

1.0 INTRODUCTION	4
2.0 BACKGROUND	4
2.1 Academic Program	5
2.2 Research Areas	6
2.3 Library	6
2.4 Outreach	6
3.0 VISION, MISSION AND CORE VALUES	6
3.1 Vision	6
3.2 Mission	6
3.3 Core Values	7
4.0 CDM SWOC	7
4.1 Strength	7
4.2 Weakness	7
4.3 Opportunities	8
4.4 Challenges	8
5.0 GOAL AND OBJECTIVES	8
5.1 Goals	8
5.2 Objectives	9
6.0 STRATEGIES AND ACTIONS	9
7.0 IMPLEMENTATION AND MONITORING PLAN	13

1. INTRODUCTION

The Strategic Plan of the Central Department of Mathematics, Tribhuvan University (CDM-TU), serves as a roadmap for the next five years to strengthen the department, enhance education, and generate scientific and societal benefits through research. Operational planning will be conducted for teaching, research, infrastructure, communications, recruitment, outreach, and other relevant areas. Regular updates to our annual plans will ensure accountability in achieving specific and measurable actions aligned with our strategic goals.

2. BACKGROUND

Mathematics is very interesting, important and forms the foundation of physical sciences and technology. Its importance is growing in various areas such as business, finance, management, engineering, ICT, biology, medicine, and many social sciences.

The Central Department of Mathematics was established in 1959 AD (2016 BS), concurrently with the establishment of Tribhuvan University. It operates under the Institute of Science and Technology and offers Master's, Master of Philosophy, and PhD programs in pure and applied mathematics. Our comprehensive programs encompass diverse areas such as algebra, number theory, topology, mathematical analysis, functional analysis, measure theory, numerical analysis, optimization, differential equations, graph theory, and fluid mechanics.

To support their research, students collaborate with their thesis advisors and can attend tutorial classes for additional assistance. These experiences cultivate problem-solving skills and critical thinking abilities, preparing students for lifelong learning and professional success. Our faculty members are highly qualified and possess teaching experience and research backgrounds from both Tribhuvan University and renowned institutions abroad. Our faculty includes PhD and Post-Doc holders who have received prestigious fellowships like Fulbright, NSERC, ERASMUS, DAAD, AvH Foundation, and other research grants. Many of our alumni and faculty members have achieved significant accomplishments in academia, research, and industry both in Nepal and internationally. Through efficient resource allocation, our aim is to produce high-quality professionals capable of tackling mathematical challenges for the benefit of the industry and society.

The department actively hosts and organizes various international conferences, workshops, seminars, compact courses, teachers' orientation programs, and lectures in various mathematical disciplines. These events are conducted independently or in collaboration with national and international partners, including DAAD, Humboldt Foundation, and other universities and institutions. We maintain strong collaborations with organizations like the Nepal Mathematical

Society, Chinese Mathematical Society, Indian Mathematical Society, ANMA, and others, all of which contribute to the advancement of research. Our efforts in research dissemination include the publication of a peer-reviewed journal called "The Nepali Mathematical Sciences Report" on a biannual basis.

2.1 Academic Programs:The CDM-TU offers graduate programs leading to the degrees of Master of Science (M.Sc.), Master of Philosophy (M.Phil.), and Doctor of Philosophy (Ph.D.). These programs are designed to cater to students with a strong inclination towards research, providing them with opportunities to pursue advanced studies and develop their interests in depth.

Master in Mathematics:The M.Sc. in Mathematics program is a two-year integrated course consisting of four semesters. It encompasses fundamental theories, problem-solving skills, computational skills, compulsory and optional courses, and a thesis component. The thesis provides an opportunity for students to engage in original research, learn research methodology, and present their findings through a thesis and articles published in peer-reviewed journals. There is a growing trend of M.Sc. graduates from CDM publishing articles in national and international journals. The M.Sc. curriculum is regularly updated to align with national requirements and international trends. The department offers four compulsory courses, namely Topology I, Measure and Integration I, Functional Analysis I, and Algebra I. The remaining subjects are optional, allowing students to tailor their studies according to their interests. Many graduates pursue careers in academic organizations, while others secure significant positions in both public and private sectors within the country. The academic degree earned by M.Sc. students at CDM equips them to pursue doctoral programs at leading universities abroad.

Master of Philosophy (M.Phil.) in Mathematics:The M.Phil. Program is a newly introduced initiative aimed at enhancing the quality of scholars in mathematics within universities and colleges. The program focuses on providing advanced research skills to scholars, with the ultimate goal of improving the quality of faculty members in these institutions and nurturing potential candidates for Ph.D. programs. The M.Phil. Program is an additional degree offered by the department and spans three semesters. The first two semesters encompass a range of pure and applied courses, including a research techniques course and a seminar. Students are required to earn a total of 16 credits per semester. The third semester is dedicated to thesis writing, which must be approved based on publication standards.

Doctor of Philosophy (PhD) in Mathematics:The department is dedicated to delivering exceptional teaching, promoting interdisciplinary research, and serving both students and the teaching community in the application of Mathematics to various disciplines. The primary

aim of the PhD programs is to facilitate candidates in achieving a higher level of scientific expertise in their chosen specializations. These programs are open to both full-time and part-time researchers.

Research Areas:The CDM encompasses a wide range of research areas, aiming to advance pure and applied mathematics and anticipate future directions in research. The department excels in its research capabilities, offering diverse research opportunities in fields such as Optimization, Differential Equations, Bio-mathematics, Analysis, and Number Theory. The academic staff members provide guidance and supervision in these research endeavors. The outcomes of this research are often published in esteemed national and international journals.

CDM actively encourages its faculty members and students to develop research proposals and seek grants from national and international funding organizations. Both faculty members and Ph.D. scholars have successfully obtained research grants from various institutions, including the UGC, NAST, NSF, and others.

2.2 Library: A small library is available in the department, which does not have study space, and lacks trained librarian. The library collections include books for texts and reference, thesis. These are useful resources when writing thesis or a research paper. A very big Central Library of TU is located within the premise of university campus. The Central library is housed large collections of books, thesis etc.

2.3 Outreach:The objective of our outreach activities is to disseminate knowledge and raise awareness about current societal issues in the field of mathematical sciences and the environment. CDM places a significant emphasis on outreach, and we encourage all faculty members and students to actively share their research with the wider public.

3. VISION, MISSION AND CORE VALUES

3.1 CDM VISION

The Central Department of Mathematics at Tribhuvan University (CDM-TU) aims to establish itself as an autonomous institute and gain recognition as a Center of Excellence on the international stage. Our vision is to be a leading, student-centered institution that prioritizes teaching, research, and outreach while fostering innovation.

3.2 CDM MISSION

CDM-TU is dedicated to its mission of advancing and expanding knowledge in the field of mathematics. Our goal is to become a global center of learning, academic excellence, and innovative research. We strive to develop strong problem-solving skills that can be applied to real-world challenges across various disciplines within mathematics education.

3.3 CORE VALUES

The Central Department of Mathematics, TU, operates according to its core values, which guide its mission and vision. The department upholds the following values:

- **Academic Freedom:** We foster an environment of free exchange of ideas, respecting academic freedom in research, teaching, and outreach.
- **Innovation and Creativity:** We encourage inquiry, knowledge creation, and dissemination through innovation and creativity.
- **Quality and Excellence:** We strive to deliver high-quality and excellent outcomes in all our endeavors.
- **Trust and Integrity:** We prioritize trust and cultivate an environment that upholds integrity and respect for all.
- **Stewardship and Accountability:** We responsibly manage departmental resources and hold ourselves accountable.
- **Sustainability:** We promote responsible resource usage and advocate for long-term sustainable practices.
- **Transparency and Accountability:** We value openness, transparency, and adherence to good governance principles.
- **Diversity and Inclusion:** We embrace the benefits of diverse backgrounds and experiences, fostering inclusivity.
- **Leadership and Teamwork:** We believe in professionalism, responsibility, innovation, and collaborative teamwork.
- **Scientific Advocacy:** We advocate for using scientific information to inform science policy and public decision-making.

These core values shape our approach and guide our actions as we strive for academic excellence and societal impact.

4. CDM SWOC

The Central Department of Mathematics, Tribhuvan University, serves as the premier institution for mathematics in Nepal. CDM provides a comprehensive educational experience, conducts impactful research, and promotes engagement with the aim of informing, preparing, challenging, and inspiring individuals.

Strength	Weakness
<ul style="list-style-type: none"> • Academic reputation in higher education. • Affordable tuition fee. • Location privilege. • Large network of the Alumni and campuses in the country. • Highly qualified and trained faculties for mentoring students. • Government support ensured through the Tribhuvan University Central Office and University Grants Commission (UGC). • Large land acreage available. 	<ul style="list-style-type: none"> • Limited budget for infrastructure development and research. • Limited built up space. • Inadequate manpower for specialized areas for teaching and research. • Underfunded and short-term research. • Lack of the state-of-the-art facilities and infrastructures in emerging areas. • Poor collaboration with government and other organizations. • Low research output and low work morale

Opportunities	Challenges
<ul style="list-style-type: none"> • Increasing demand of mathematics graduates • Potential for academic linkages and collaboration • Large alumni base • Potential for increase in income generating activities. • University policy to develop the Central Departments as center of Excellence. • Increasing awareness of importance of mathematics 	<ul style="list-style-type: none"> • Unstable political environment and influence in the university • Low investment of government in science and technology • Securing more funding supports • No enough job placement for mathematics graduates in government services • Degrading quality of bachelor level education • Lack of space to run the programs

5. Goals and Objectives

The goal of CDM-TU is to establish itself as an autonomous and Center of Excellence Institute in Mathematics, recognized for developing and delivering advanced curricula. We aim to create synergies between education, research, and entrepreneurship that contribute to the advancement of science and benefit society as a whole.

Objectives

- To produce highly skilled and competent graduates in mathematics.
- To gain recognition as a center of excellence in research by promoting quality, quantity, and impact.
- To develop state-of-the-art facilities and infrastructure that enable excellence in teaching, research, and service.
- To support and enhance a vibrant academic environment that fosters the personal growth of faculty, staff, and students.
- To promote advocacy, outreach, collaboration, and partnerships that align with the department's goals.
- To play a key role in national policy formation and development.
- To achieve international standards and accreditation for quality education, research, and professional services.

6. STRATEGIES

The Central Department of Mathematics (CDM) at Tribhuvan University (TU) has been actively contributing to the field of mathematics through its teaching and research endeavors since its establishment. The primary objective of the department's strategic plan is to enhance both teaching and research to ensure the delivery of high-quality education and produce competent professionals in the field of mathematics. Here, we outline the strategic plans for the upcoming years, starting from 2023-2027 and beyond.

Plan 1: Upgrade the Syllabi and Entrance Guidelines

CDM is committed to providing a research-intensive education of high quality to produce highly skilled and well-educated graduates. A well-structured curriculum with clear objectives forms the foundation of this endeavor.

The Institute of Science and Technology (IoST) is planning to restructure and design the undergraduate syllabi for its programs. CDM, through its members in the mathematics subject committee, will contribute to the revision of the mathematics syllabi. The revised syllabi will address the challenges of the modern era, ensuring alignment with national needs and international standards.

CDM regularly revises the syllabi of its Master's and M.Phil. Programs to maintain excellence in teaching and research.

One pressing issue for CDM and Tribhuvan University (TU) is the decline in student enrollment, which requires immediate attention at both institutional and national levels.

Strategies:

- Gather data to investigate the effectiveness of the existing curricula.
- Analyze the data to identify the gap between the existing curricula and the national need and international standards.
- Develop reform guidelines and upgraded curricula.
- Set standard regulations so that the requisites of the entrance examinee is flexible and meets the quality standards.
- Provide pre-requisite courses to those who pursue degree in CDM but needs background mathematical knowledge.
- Adopt credit transfer and credit accumulation facility to enable student exchange.

Plan 2: Upgrade and Launch Academic Program

The decrease in undergraduate and subsequent graduate program enrollments in Nepali universities is a national issue. This trend indicates a loss of human resources and capital flight to other countries, which has significant implications for the nation. One of the contributing factors to this serious issue is the existing programs offered by universities, including CDM. To address this challenge and attract more graduate students in mathematics, CDM is planning to launch a new applied academic program in the near future. This program aims to enhance the appeal and relevance of mathematics education, thereby encouraging more students to pursue advanced studies in the field.

We are planning to address this issue from our side.

Strategies:

- Review and reassess the current programs.
- Identify the disparity between the existing state-of-the-art and market demand.
- Enhance and improve the Master's and MPhil programs.
- Provide support to other programs within Tribhuvan University that include mathematics and mathematical courses.
- Ensure the implementation of the academic calendar.
- Initiate to launch additional new programs within the department.

Plan 3: Research

Quality research is one of the main objectives so that CDM can contribute to the mathematical frontier in knowledge development as well as can produce qualified human resource to serve the nation in different fields where the mathematical knowledge is required.

Strategies:

- **Journal:** CDM has been publishing an indexed peer reviewed journal “The Nepali Mathematical Sciences Report”.
 - (i) Upgrade the submission of manuscript manual to online.
 - (ii) Make a better platform for researchers around the globe as an outlet for new results.
 - (iii) Initiate the process for obtaining the Scimago ranking of the Journal.
- Provide necessary programming skill for example, MATLAB, Python as non-degree courses.
- Promote student and faculties for grant applications, and implement internal grant peer-reviews to provide feedback prior to submission.
- Encourage M.A/ M.Sc. , M.Phil. , and PhD students and faculties to conduct research on the emerging fields, interdisciplinary and multidisciplinary areas.
- Support policy for and attract dedicated researchers such as research associates, postdocs, adjunct faculties and faculty members.

Plan 4: Promote Research Publication and Dissemination: Strategies:

- Encourage faculty members and students to publish their research in high-impact ISI Journals.
- Support and encourage researchers to participate in conferences and scientific meetings.
- Organize an annual internal research seminar as well as periodic national and international conferences.
- Maintain records of faculty members' publications and citation rates.

Plan 5: Collaboration

One of the most effective tools for excelling in quality research and teaching is collaboration with other universities and multidisciplinary institutions. It is also crucial to establish

partnerships with institutions that are designed for the implementation of the knowledge produced and refined within the university.

Strategies:

- Extend both short-term and long-term collaborations with universities, institutions, and foundations from abroad and within Nepal.
- Promote and support short-term academic visits.
- Foster collaboration in jointly supervised research activities, including guidance in thesis writing.
- Collaborate in organizing workshops, summer schools, and conferences jointly.

Plan 6: Library

CDM has its own small library, and there is also a central library within a few minutes' walking distance. Students have convenient access to the central library.

Strategies:

- Enhance the departmental library by adding more graduate-level books.
- Establish virtual connections between both libraries.
- Procure book shelves and maintained reading space.
- Initiate and regularly update e-library program and e-repository database.

Plan 7: Math Lab

CDM can perform better if a standard math lab is established.

Strategies:

- Take the initiative to establish a well-equipped, modern math lab to enhance both teaching and research.

Plan 8: Job placement Cell

One of the primary reasons for the decline in enrollment in university programs is that students are uncertain about their job prospects after obtaining their degree. CDM can advocate for and demonstrate potential job sectors, as well as engage in lobbying with government policymakers to facilitate job placement for mathematics graduates. Establishing a job placement cell within the department will be a significant milestone in achieving this objective.

Strategies:

- Establish a job placement cell that offers valuable consultation services for further study or job placement.

Plan 9: Policy for International Students

CDM offers the highest academic degree in mathematics at TU. It serves as an ideal destination for international students seeking quality education.

Strategies:

- Develop a policy aimed at attracting international students to pursue their studies.

Plan 10: Optimize Financial Resources and Professionalize staff

Strategies:

- Enhance the efficiency and strengthen the financial management system.

- Improve the efficiency of fund utilization and strengthen procedures for financial accountability.
- Provide support for training administrative and finance staff in new technologies.

Plan 11: Conduct Advocacy for Creating / facilitating job opportunities for Graduates

Strategies:

- Advocate for the creation of employment opportunities for mathematics graduates in the government sector.
- Initiate interactions with the government and other sectors to develop collaborative programs.
- Coordinate with campuses of TU that offer bachelor's programs in mathematics.

Plan 12: Establish and Promote a Functional Network of Alumni

Strategies:

- Form, empower, and mobilize alumni to actively support the goals of the department.
- Establish a database of department graduates and maintain regular communication with them.
- Encourage alumni to participate in fundraising activities for the department and provide mentoring for career guidance.

Plan 13: Information management and Dissemination

Strategies:

- Establish a database for key information of the department.
- Improve information management efficiency by implementing the EMIS (Enterprise Management Information System).
- Maintain a dynamic website that provides public access to departmental information.

Plan 14: Implement Internal Quality Assurance Mechanism to Achieve International Standards and Accreditation

Strategies:

- Establish an Internal Quality Assurance Committee (IQAC) to collaborate with the QA units of the TU (Tribhuvan University) and UGC (University Grants Commission).
- Develop a database to support efforts quality to obtain quality assurance accreditation.
- Achieve quality assurance and accreditation and maintain standard.

Plan 15: Construction and renovation of annexed building

Strategies:

- Construction and renovation can be made as early as possible
- M.Phil. and Ph.D. programs runs from annexed building
- Partitions can be made for class room, study room and teachers cabin etc.

7. Implementation and Monitoring Plan

7.1 Implementation

The goals of the department of strategic plan will be achieved through the successful implementation of strategic initiatives. CDM firmly believes that reform and innovation are best realized through a robust and well-informed committee system. Many of these strategic initiatives will be led by the Strategic Plan Implementation Committee (CDM-SPIC), which will consist of department heads, faculty members, staff, and, where appropriate, students. CDM will also establish faculty groups in each interdisciplinary and collaborative research area to develop specific action plans. Certain initiatives will be led by individuals or teams with expertise in relevant areas. During the implementation process, the Department will collaborate with university authorities and maintain communication with other partners. Additionally, the Department will seek partnerships and financial support from various sources, including the University Grants Commission, the Government of Nepal, local government bodies, and other partners.

7.2 Monitoring and Evaluation

The annual review of implementation progress, which includes evaluating defined metrics and reassessing priorities and actions, will be crucial for tracking our success in reaching our goals. To measure its progress towards the defined goals and achieve the desired long-term impact, the department will implement a comprehensive evaluation system using impact and performance metrics.