

# Strategic Plan for Central Department of Microbiology

## 2023-2027



**Central Department of Microbiology  
Tribhuvan University  
Kirtipur, Kathmandu**

**July, 2022**

## **1. Background**

Central Department of Microbiology, one of the first centres of excellence, conducting advanced level Microbiology education in the country was established in 1990 under Institute of Science and Technology (IOST) at Tribhuvan University, Kirtipur, Kathmandu. Since its inception, the department is offering Master's and Ph. D. Degree courses in Microbiology. Since its establishment, department has produced more than 650 Masters graduate and more than 14 doctoral level graduates with almost 30 graduates completing masters and a doctoral graduate every year. The department is enriched with highly qualified, skillful and competitive faculty members with specializations in various fields of microbiology: medical, public health, biotechnology, environmental, food and agriculture microbiology. In addition to the faculties, department has qualified staff in the laboratory, administration and finance to support departments daily operation of teaching learning and research activities.

Masters level Microbiology course of Tribhuvan University is designed and periodically revised to include global developments of science and technology in the curriculum. Initially for the first 15 years, the Masters course was based on annual system, which was revised in 2013 to adopt the semester system initiated by Tribhuvan University. A dissertation based on a short original research by the student under the supervision of a faculty as supervisor is a mandatory requirement of the course since the inception for providing an opportunity to learn research methodology, and document research findings in the form of a thesis and an original research article published in a peer reviewed journal. Recently, there is an increasing trend of publishing articles in national and international journals. The faculties and students are encouraged by the department to apply for research grants, as and when available. The department from its beginning has been involved in researches in different areas; such as food, water, medical/health particularly in vector borne diseases, vaccines. Besides, department has also been conducting trainings on; laboratory capacity assessment and strengthening, quality assurance systems, malaria microscopy, assessment of antimicrobial use and resistance status in the country in collaboration with the different agencies of the Government and UN agencies. In order to build the capacity of microbiology faculties of affiliated colleges, department has been organizing different hands on trainings, with acquisition of fund from University Grants Commissions.

Within the 32 years of establishment, the department is progressing towards being a center of excellence in Microbiology research and academics. The department possess its building with teaching/demonstration rooms and laboratories equipped with instruments required for daily experiments of laboratory classes and researches of the students. Internet and small departmental library facilities are added assets in the department for research activities.

## 2. Departmental Capacity and Strengths

Central Department of Microbiology has 4 professors, 5 associate professors, and 7 lecturers. Eleven faculties have PhD degree and most of others are in the process of completion of their PhD degree. There are 14 administrative and laboratory staff in the department.

The current physical infrastructure capacity of the department, is limited to teaching and learning activities, and basic research activities for students. Besides practical laboratories, department has managed to facilitate separate research laboratory designed for molecular experiments.

The course of M.Sc. Microbiology has been divided into four semesters within two academic years. The first semester course covers the disciplines of General Microbiology, Immunology, Microbial Genetics, Microbial Biochemistry and practical on these courses. The second and third semesters offers specialized courses of four different disciplines of Microbiology which students make selection. Among the four disciplines from second semester the department has been offering specialized courses on Medical Microbiology and Public Health Microbiology. The fourth semester is entirely skill development and research oriented, which includes internships and dissertation research.

## 3. Vision, Mission, Goal and Objectives of the Department

**Vision:** To become an internationally recognized institute under Tribhuvan University specialized in microbiology education and bio-medical research of national and international importance.

**Mission:** To develop knowledgeable and skillful human resources for the nation through academic courses, and conduct research generating evidences for policy making.

**Goal:** The goal of the department is to produce specialized, knowledgeable and skillful microbiology graduates capable in contributing to national development.

**Objectives:** The objectives of the department are:

- a) To provide quality education in microbiology in the country
- b) To conduct research generating credible evidences for the policy making, and promoting translation of evidence into policy/practice
- c) To provide specialized services in microbiology through departmental laboratory

#### 4. Analysis of Strength, Weakness, Opportunities and Threats (SWOT)

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Strong academic faculties with extended academic history</li> <li>• National and international exposure of the senior faculties and continuation of the professional network</li> <li>• Almost all junior faculties are at different stages of their doctoral research in different areas of specialization.</li> <li>• International and national collaboration through MoU and grant agreements</li> <li>• Popular academic program/disciplines</li> <li>• Availability of physical and other assets such as land</li> <li>• Availability of laboratory equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Limited financial resources to upgrade the facilities including laboratory equipment and procurement of costly but quality laboratory reagents including for molecular works.</li> <li>• Lack of research fund, for encouragement and motivation of both faculties and students</li> <li>• Lack of mechanism for faculty development, their exposure and utilization of their expertise and knowledge</li> <li>• Inadequate physical infrastructure; insufficient rooms for faculties, meeting/seminar hall, laboratories with adequate space and facilities</li> <li>• Due to lack of resources timely update of existing courses and new courses have not been introduced.</li> <li>• Lack of data system and EMIS</li> <li>• Stakeholders collaboration/cooperation/ on the job training and on-college hiring</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• Public willingness to invest in higher education</li> <li>• Opportunity to develop as a leading model academic institution</li> <li>• High potential to provide research and consultancy services on health and science related activities for national and international sectors</li> <li>• Developing networks with national and international academic institutions</li> <li>• Upgrade quality education through incorporation of new technology based teaching learning and research activities</li> </ul>	<ul style="list-style-type: none"> <li>• Small building with very few rooms for expansion of scope and laboratory</li> <li>• Low priority from the Government/University authorities in investment in Science and Technology and particularly in Microbiology, in making internationally and professionally saleable graduates in job markets.</li> <li>• Professional and personnel matters hindering professional licensing of the graduates for independent employment.</li> <li>• Conducting course based PhD program, semester system M.Sc. program through existing limited human resources</li> </ul>

## 5. Strategies

- a) Strengthen the teaching learning modalities at the department, through introduction of technology facilitated teaching and creation of online discussion forums for QA.
- b) Expand departmental research collaboration with international and national organizations, involving faculties and students with improving exposure and generating credible evidences for policy changes at national/regional and global level in subject area.
- c) Further develop/expand physical infrastructure of the department, making it capable for conducting international and national research and teaching.
- d) Organize faculty and staff development activities, in improving knowledge, skills and visibility and also support faculties in participation and presentation of department activities in international professional meetings/conferences.
- e) Conduct advocacy for creating/facilitating job opportunities for microbiology graduates.
- f) Improve collaboration with other international/national universities institutes/Government agencies.
- g) Update and upgrade the quality of teaching through introduction of new/short courses and regular revision in the existing courses.
- h) Publish research finding generated by the department, information, education and communication materials from the department.

## 6. Activities under each Strategy

### Strengthen the teaching learning modalities at the department

- a) Enforce academic calendar of Tribhuvan University to regulate courses and examinations.
- b) Update and transform teaching methods to incorporate research and adapt inquiry based participatory pedagogy in class room teaching.
- c) Support M.Sc. and Ph.D. students to conduct dissertation research in new areas.

### Expand departmental research

- a) Conduct basic and applied research in microbiology; particularly in investigation of emerging and re-emerging infectious pathogens including influenza, dengue, food borne infections/intoxications, global hot topic on antimicrobial resistance.
- b) Perform molecular level characterization of microorganisms indigenous to Nepal.

- c) Increase academically and skillfully trained human resources for industries like Pharmaceutical, fast growing consumer goods/foods, bioremediation, improving the fertility through agricultural microbiological practices.
- d) Support Government of Nepal's initiatives/programs in infectious diseases, antimicrobial evaluations, antimicrobial resistance, zoonotic diseases, blood and laboratory safety and laboratory capacity strengthening.

#### **Develop/expand physical infrastructure of the department**

- a) Construct new laboratory building accommodating medical microbiology division with specialized biosafety laboratories up to BSL3 level, public health microbiology division with specialized facilities for investigation of water, air, foods of public health importance, food microbiology division, and agriculture microbiology with bioremediation, plant biotechnology, bio-fertilizers and biopesticides research and production, gene sequencing.
- b) Purchase instruments to equip laboratories and maintain the existing equipment of the department.
- c) Establish and renovate laboratories with essential facilities.

#### **Organize faculty and staff development activities**

- a) Support for post-doctoral trainings of faculties.
- b) Facilitate in PhD level academic study/training opportunity for junior faculties in specialized areas.
- c) Manage short term training of faculties and laboratory staff in advanced technologies and specialized instruments, in the universities having MoU with TU and beyond.
- d) Conduct training and orientation workshops for faculty to help them incorporate innovations in teaching and research.
- e) Manage training of administrative and finance staff in new technologies.

#### **Conduct advocacy for creating/facilitating job opportunities**

- a) Conduct dialogues with relevant stakeholders to create employment opportunities in government sectors; Ministry of Education, Science and Technology, Ministry of Health and Population, Ministry of Urban Development, Ministry of Drinking Water and Sanitation, Ministry of Agriculture, etc.
- b) Conduct advocacy through meetings, provision of letters for licensing for M.Sc. medical microbiology graduates.
- c) Conduct advocacy with stakeholders to create job opportunities for microbiology graduates in urban water supply system, food quality control laboratories, pharmaceutical industries, waste management sectors, Water Sanitation and Hygiene (WASH) sectors, food industries

including breweries, dairy industries, fermented food industries, food quality control laboratories, and agriculture sectors.

- d) Conduct tracer study among M.Sc. graduates to identify job markets and assess pros and cons of microbiology education in Nepal.

**Improve collaboration with international/national universities/ institutes/Government agencies**

- a) Develop MoU with other universities, institutes and government agencies for collaborative research/academic activities and support.

**Update and upgrade the curriculum for quality education**

- a) Design new curriculum as necessary by the programme and introduce new academic programs.
- b) Revise and update the existing M.Sc. curricula concurrent with new trends in technology.
- c) Develop courses for PhD programme.

**Publish information, education and communication materials**

- a) Publish journal "Tribhuvan University Journal of Microbiology" regularly to promote research culture and dissemination of the information, and upgrade the journal targeting for indexing and recognize internationally.
- b) Publish annual report and other academic documents of the department.
- c) Maintain and update the website of the department regularly.

## 7. Work Plan for Implementation of Strategies (2023-2027)

Strategies	Activities	2023	2024	2025	2026	2027
1. Strengthen the teaching learning modalities at the department	a) Enforce academic calendar of Tribhuvan University to regulate courses and examinations.	X	X	X	X	X
	b) Update and transform teaching methods to incorporate research and adapt inquiry based participatory pedagogy in class room teaching.		X	X	X	X
	c) Support M.Sc., Ph.D. students to conduct dissertation research in new areas.	X	X	X	X	X
2. Expand departmental research	a) Conduct basic and applied research in microbiology, particularly in investigation of emerging and re-emerging infectious pathogens including influenza, dengue, food borne infections/intoxications.	X	X	X	X	X
	b) Perform molecular level characterization of microorganisms indigenous to Nepal.	X	X	X	X	X
	c) Increase academically and skillfully trained human resources for industries like Pharmaceutical, fast moving consumer goods/foods, bioremediation, improving the fertility through agricultural microbiological practices.	X	X	X	X	X
	d) Support Government of Nepal initiatives/programs in infectious diseases, antimicrobial evaluations, antimicrobial resistance, water quality evaluation, zoonotic diseases, blood and laboratory safety and laboratory capacity strengthening.	X	X	X	X	X
3. Develop/expand physical	a) Construct new laboratory building accommodating medical microbiology division with specialized biosafety laboratories, public health microbiology division with specialized facilities for investigation of water, air, foods			X	X	X

infrastructure of the department	of public health importance, food microbiology division, and agriculture microbiology with bioremediation, plant biotechnology, bio-fertilizers and biopesticides research and production.					
	b) Purchase instruments to equip laboratories and maintain the existing equipment of the department.	X		X		
	c) Establish and renovate laboratories with essential facilities.	X		X		
4. Organize faculty and staff development activities	a) Support for post-doctoral training of faculties.		X	X	X	X
	b) Assist in Ph.D. level academic study/training opportunity for junior faculties in specialized areas.		X	X	X	X
	c) Manage short term training of faculties, laboratory staff in specialized instruments and areas in universities having MoU with Tribhuvan University.		X	X	X	
	d) Conduct training and orientation workshops for faculty to help them incorporate innovations in teaching and research.	X	X	X	X	X
	e) Manage training of administrative and finance staff in new technologies.	X	X	X		
5. Conduct advocacy for creating/facilitating job opportunities	a) Conduct dialogues with relevant stakeholders to create employment opportunities in government sectors, Ministry of Education, Science and Technology, Ministry of Health, Ministry of Urban Development, Ministry of Drinking Water and Sanitation, Ministry of Agriculture, and others.	X	X			
	b) Conduct advocacy through meetings, provision of letters for licensing for M.Sc. medical microbiology graduates.	X	X			
	c) Conduct advocacy with stakeholders to create job opportunities for microbiology graduates in urban	X	X	X		

	water supply system, food quality control laboratories, pharmaceutical industries, waste management, Water Sanitation and Hygiene (WASH) sectors, food industries including breweries, dairy industries, fermented food industries, food quality control laboratories, pharmaceutical industries, and agriculture sectors.					
	d) Conduct tracer study among M.Sc. pass out graduates to identify job markets and assess pros and cons of microbiology education in Nepal.	X				
6. Improve collaboration with other international/national universities/institutes/Govt. agencies	a) Develop MoU with other institutes for collaborative research/academic activities and support.	X	X	X	X	X
7. Update and upgrade the curriculum for quality education	a) Design new curriculum as necessary by the programme and introduce new academic programs.			X	X	
	b) Revise and update the existing M.Sc. curricula keeping new trends in technology.			X	X	
	c) Develop courses for Ph.D. programme.	X	X			
8. Publish information, education and communication materials	a) Publish journal "Tribhuvan University Journal of Microbiology" regularly to promote research culture and dissemination of the information.	X	X	X	X	X
	b) Publish annual report and other academic documents of the department.	X	X	X	X	X
	c) Maintain and update regularly the website of the department.	X	X	X	X	X