

University of Mumbai

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Academic Authorities,
Meetings & Services (AAMS)
Room No. 128, M. G. Road, Fort,
Mumbai - 400 032.
Tel. 022-68320033

Re- accredited with A ++ Grade (CGPA 3.65) by NAAC
Category- I University Status awarded by UGC

No. AAMS_UGS/ICC/2025-26/ 33

Date: 26th May, 2025.

CIRCULAR:-

Sub : Certificate Course in RT-PCR.

All the Principals of the Affiliated Colleges, Head of the University Departments and Directors of the recognized Institutions under Faculty of Science and Technology are hereby informed that the recommendations made by the Ad-hoc Board of Studies in Nano Science and Nano Technology at its meeting held on 23rd September, 2024, and subsequently passed by the Board of Deans at its meeting held on 30th November, 2024 vide Item No. 6.3 have been accepted by the Academic Council at its meeting held on 4th December, 2024 vide Item No.6.35 (N) and subsequently approved by the Management Council at its meeting held on 21st February, 2025 vide Item No. 22 and that in accordance therewith, in exercise of the powers conferred upon the Management Council under Section 74(4) of the Maharashtra Public Universities Act, 2016 (Mah. Act No. VI of 2017) the following program with Ordinance for Title of the program, Eligibility and Regulation numbers for Duration of Program, Intake Capacity, Scheme of Examinations, Standard of Passing and Credit Structure along with syllabus of **Certificate Course in RT-PCR** as per appendix have been introduced and the same have been brought into force with effect from the academic year 2025-26.

Sr. No	Name of the Program	Ordinance no. for Title	Ordinance no. for Eligibility	
A	Certificate Course in RT-PCR	O.SU - 533 A	O.SU - 534 A	Two Week

2/-

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Date : 26th May, 2025.

: 2 :

Regulation Nos	
Duration	R. SU - 581
Intake Capacity	R. SU - 582
Scheme of examination	R. SU - 583
Standard of Passing	R. SU - 584
Credit Structure	R. SU - 585

(The said circular is available on the University's website www.mu.ac.in).

MUMBAI - 400 032
26th May, 2025


(Dr. Prasad Karande)
REGISTRAR

A.C/6.35 (N)/4/12/2024.
M.C/22/21/2/2025.

Copy forwarded with Compliments for information to:-

- 1) The Chairman, Board of Deans
- 2) The Dean, Faculty of Science & Technology,
- 3) The Chairman, Board of Studies in Nano Science and Nano Technology,
- 4) The Director, Board of Examinations and Evaluation,
- 5) The Director, Board of Students Development,
- 6) The Director, Department of Information & Communication Technology,
- 7) The Director, Centre for Distance and online Education (CDOE), Vidyanagari,
- 8) The Co-ordinator, MKCL

Copy forwarded for information and necessary action to :-	
1	The Deputy Registrar, (Admissions, Enrolment, Eligibility and Migration Dept)(AEM), dr@eligi.mu.ac.in
2	The Deputy Registrar, Result unit, Vidyanagari drresults@exam.mu.ac.in
3	The Deputy Registrar, Marks and Certificate Unit,. Vidyanagari dr.verification@mu.ac.in
4	The Deputy Registrar, Appointment Unit, Vidyanagari dr.appointment@exam.mu.ac.in
5	The Deputy Registrar, CAP Unit, Vidyanagari cap.exam@mu.ac.in
6	The Deputy Registrar, College Affiliations & Development Department (CAD), deputyregistrar.uni@gmail.com
7	The Deputy Registrar, PRO, Fort, (Publication Section), Pro@mu.ac.in
8	The Deputy Registrar, Executive Authorities Section (EA) eau120@fort.mu.ac.in He is requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to the above circular.
9	The Deputy Registrar, Research Administration & Promotion Cell (RAPC), rapc@mu.ac.in
10	The Deputy Registrar, Academic Appointments & Quality Assurance (AAQA) dy.registrar.tau.fort.mu.ac.in ar.tau@fort.mu.ac.in
11	The Deputy Registrar, College Teachers Approval Unit (CTA), concolsection@gmail.com
12	The Deputy Registrars, Finance & Accounts Section, fort draccounts@fort.mu.ac.in
13	The Deputy Registrar, Election Section, Fort drelection@election.mu.ac.in
14	The Assistant Registrar, Administrative Sub-Campus Thane, thanesubcampus@mu.ac.in
15	The Assistant Registrar, School of Engg. & Applied Sciences, Kalyan, ar.seask@mu.ac.in
16	The Assistant Registrar, Ratnagiri Sub-centre, Ratnagiri, ratnagirisubcentar@gmail.com
17	The Director, Centre for Distance and Online Education (CDOE), Vidyanagari, director@idol.mu.ac.in
18	Director, Innovation, Incubation and Linkages, Dr. Sachin Laddha pinkumanno@gmail.com
19	Director, Department of Lifelong Learning and Extension (DLLE), dlleuniversityofmumbai@gmail.com

Copy for information :-	
1	P.A to Hon'ble Vice-Chancellor, vice-chancellor@mu.ac.in
2	P.A to Pro-Vice-Chancellor pvc@fort.mu.ac.in
3	P.A to Registrar, registrar@fort.mu.ac.in
4	P.A to all Deans of all Faculties
5	P.A to Finance & Account Officers, (F & A.O), camu@accounts.mu.ac.in

To,

1	The Chairman, Board of Deans pvc@fort.mu.ac.in
2	Faculty of Humanities, Offg. Dean 1. Prof.Anil Singh Dranilsingh129@gmail.com Offg. Associate Dean 2. Prof.Manisha Karne mkarne@economics.mu.ac.in 3. Dr.Suchitra Naik Naiksuchitra27@gmail.com
	Faculty of Commerce & Management, Offg. Dean, 1 Prin.Ravindra Bambardekar principal@model-college.edu.in Offg. Associate Dean 2. Dr.Kavita Laghate kavitalaghate@jbims.mu.ac.in 3. Dr.Ravikant Balkrishna Sangurde Ravikant.s.@somaiya.edu 4. Prin.Kishori Bhagat kishoribhagat@rediffmail.com

	Faculty of Science & Technology Offg. Dean 1. Prof. Shivram Garje ssgarje@chem.mu.ac.in Offg. Associate Dean 2. Dr. Madhav R. Rajwade Madhavr64@gmail.com 3. Prin. Deven Shah sir.deven@gmail.com
	Faculty of Inter-Disciplinary Studies, Offg. Dean 1. Dr. Anil K. Singh aksingh@trcl.org.in Offg. Associate Dean 2. Prin. Chadrashekhhar Ashok Chakradeo cachakradeo@gmail.com 3. Dr. Kunal Ingle drkunalingle@gmail.com
3	Chairman, Board of Studies,
4	The Director, Board of Examinations and Evaluation, dboee@exam.mu.ac.in
5	The Director, Board of Students Development, dsd@mu.ac.in DSW directr@dsd.mu.ac.in
6	The Director, Department of Information & Communication Technology, director.dict@mu.ac.in

University of Mumbai



Title of the Program

Certificate Course in RT-PCR

Equivalent to the On Job Training as per NEP 2020

Syllabus for the Course

Ref: GR dated 16th May, 2023 for Credit Structure of PG

(With effect from the academic year 2025-26)



Syllabus for Approval

Sr. No.	Heading	Particulars
1	O: <u>SU – 533 A</u> Title of Course	Certificate Course in RT-PCR
2	O: <u>SU – 534 A</u> Eligibility	Graduate in Biotechnology, Biochemistry, Genetics, Life Science, Molecular Biology, Microbiology, Cell Biology, Virology, Pharmacology, Bioinformatics, Cancer Biology, Environmental Science, Nano Science.
3	Duration of program R: <u>SU - 581</u>	Two weeks
4	Intake Capacity R: <u>SU - 582</u>	Maximum twenty PG students Maximum five from Industry
5	Scheme of Examination R: <u>SU - 583</u>	As per NEP 50% Internal, Continuous Assessment 50% External, Course-End Examination Individual passing in Internal and External Exams.
6	Standards of Passing R: <u>SU - 584</u>	40%
7	Credits R: <u>SU - 585</u>	04
8	Pattern:	Short Term Certificate Courses
9	Status:	New
10	To be implemented from Academic Year :	From Academic Year: 2025-26

Sign of the BOS
Prof. Vishwanath R. Patil
Chairman
BOS in Nanoscience &
Nanotechnology

Sign of the
Offg. Associate Dean
Dr. Madhav R. Rajwade
Faculty of Science &
Technology

Sign of the Offg. Dean
Prof. Shivram S. Garje
Faculty of Science &
Technology

Preamble

1) Introduction

This program delivers an extensive and thorough understanding coupled with practical experience in Real-Time PCR (qPCR). This course has been meticulously structured to foster intellectual curiosity and scientific proficiency among our students. Through an integration of scholarly coursework and experiential research opportunities, students will be equipped for prosperous careers in the domains of biotechnology, biochemistry, genetics, life sciences, molecular biology, microbiology, cell biology, virology, pharmacology, bioinformatics, cancer biology, environmental science, and nanoscience. The certificate programs establish a solid theoretical framework, practical competencies, and critical analytical skills vital for navigating the complexities and capitalizing on the prospects within the molecular biology sector. The curriculum is delivered by our distinguished faculty members, who possess expertise in their particular disciplines and exhibit a profound commitment to both pedagogy and research. They are devoted to fostering a nurturing educational atmosphere, facilitating open dialogues, and advancing collaborative research initiatives.

Students will derive significant advantages from mentorship provided by our faculty, participating in avant-garde research endeavors that extend the frontiers of scientific understanding and contribute to the progress of various scientific fields. Our objective is for our alumni to emerge as agents of positive transformation, equipped to spearhead innovation, influence industries, and confront societal challenges through their specialized knowledge.

This course is suitable for pursuing career in research, industry, education, or other domains as our program offers the essential knowledge and competencies required to thrive in your selected trajectory.

2) Aims and Objectives

The primary aims and objectives of this Certificate program are to furnish students with a comprehensive and advanced education in the RT-PCR methodology. These objectives highlight the importance of fostering students' comprehensive grasp of fundamental principles, the refinement of their research and analytical abilities, and the readiness of these individuals for fulfilling careers across various sectors, including biotechnology, biochemistry, genetics, life sciences, molecular biology, microbiology, cell biology, virology, pharmacology, bioinformatics, cancer biology, environmental science, and nanoscience. This Certificate program aspires to yield proficient and knowledgeable professionals capable of making significant contributions to scientific inquiry, industrial innovation, and the advancement of society through their specialized expertise.

3) Learning Outcomes

The learning outcomes of the Certificate Courses are designed to equip students with a comprehensive and advanced understanding of RT-PCR and its application in various allied fields. These learning outcomes will reflect the knowledge on DNA/RNA extraction, quantification, primer designing, process optimization, and data analysis that students are expected to gain upon successful completion of the program.

4) Other point (if any):

The skills and knowledge acquired during this program will make the students well-equipped for molecular biologist role.

SYLLABUS

Certificate Course in RT-PCR

Equivalent to On Job Training as per NEP 2020

UNIVERSITY OF MUMBAI

A. Syllabus for Certificate Course in RT-PCR Equivalent to On Job Training as per NEP 2020

PROGRAM OUTLINE

COURSE CODE	COURSE TITLE	PAGE NO.
NCNNUM B01	Certificate Course in RT-PCR Equivalent to On Job Training as per NEP 2020	

PROGRAMME SPECIFIC OUTCOME (PSOs)

1. Acquire a comprehensive understanding of both foundational and principles within the domain, critically analyze and devise solutions to the challenges faced in the realm of molecular biology.
2. Utilize the advanced knowledge to execute various tasks allocated to them within professional settings in both industry and academia, thereby adhering to international standards.
3. Qualitative and quantitative data analysis by employing RT-PCR methodologies, which can subsequently be evaluated utilizing the practical competencies acquired during the program.
4. Cultivate both the mindset and skill set characteristic of a scientific methodology, alongside proficiency in data analysis concerning the innovative techniques actively utilized in research institutions and industrial settings.
5. Leverage subject matter expertise, communication proficiencies, and ICT capabilities to emerge as an effective leader or collaborator within interdisciplinary domains.
6. Comprehend, oversee, and contribute to the resolution of fundamental societal challenges and environmental issues in an ethical manner, grounded in the principles of scientific knowledge acquired.
7. Demonstrate adherence to professional work ethics and the established norms associated with scientific advancement.

PROGRAM:	Certificate Course in RT-PCR Equivalent to On Job Training as per NEP 2020		
Course Code:	NCNNUM B01		
Teaching Scheme			Evaluation Scheme
Lectures (Hours per day)	Practical (Hours per day)	Continuous Assessment (CA) (Marks- 50)	Semester End Examination (Marks- 50)
02-03	05	50%	50%
Learning Objectives: • To facilitate learners in acquiring a thorough comprehension of both fundamental and sophisticated principles pertaining to DNA/RNA extraction, polymerase chain reaction (PCR), and reverse transcription PCR (RT-PCR). • To equip learners with knowledge regarding various instruments such as electrophoresis equipment, automated DNA/RNA extraction devices, and RT-PCR machinery. • To cultivate an understanding of the construction and operational principles of RT-PCR methodologies. • To implement the acquired knowledge of DNA/RNA extraction from diverse biological samples, RT-PCR procedures, and data analysis techniques to execute a range of tasks assigned to them within professional environments in both industry and academia, thus fulfilling job specifications in accordance with international standards. • To devise solutions for challenges encountered within the realm of scientific research.			

Course Outcomes:

- The learners will understand the theory and applications of PCR.
- The learners will evaluate the different techniques of sample preparation, DNA/RNA extraction, primer designing, RT-PCR reaction optimization as per sample requirement.
- The learners will apply the advanced knowledge of DNA/RNA extraction, RT-PCR, data analysis to solve various problems at molecular level.
- The learners will implement the applications of RT-PCR to real samples.
- The learners will gain knowledge on large data handling and analysis using various software.
- The learners will try to accomplish a solution to problems encountered in the field of research.

Syllabus

Course code NCNNUM B01	Theory on RT-PCR	15 hrs (1 credit)
	Introduction to Real-Time PCR	3 Hrs
	Understanding qPCR Data and quantification methods.	3 Hrs
	Advanced Topics in Real-Time PCR- Multiplex and digital PCR.	3 Hrs
	Applications of Real-Time PCR in Gene Expression Analysis and pathogen detection.	3 Hrs
	Clinical applications of RT-PCR in Diagnostics and personalized medicine, Environmental monitoring, industrial applications.	3 Hrs
Course code NCNNUM B01	Practicals on RT-PCR	90 Hrs (3 credit)
	Practical – • Sample preparation and extraction of DNA/RNA from different samples and quality assessment using AGE. • RNA/DNA extraction from various samples using automatic extraction and quality assessment using spectroscopy method. • Primer and probe designing Optimization and amplification using Real-Time PCR. • Data analysis and Interpretation using software. Lab and industrial visit	
	Total Credits	4

Reference Books:

1. Farrell, R. E. (1998). RT PCR. Rna Methodologies, 283-320.
2. King, N., & O'Connell, D. J. (Eds.). (2010). RT-PCR Protocols. New York:: Humana Press.
3. Domingues, L. (2017). PCR. Springer New York.
4. Basu, C. (Ed.). (2015). PCR primer design. New york: Humana Press.
5. Yuan, J. S., Reed, A., Chen, F., & Stewart, C. N. (2006). Statistical analysis of real-time PCR data. BMC bioinformatics, 7, 1-12.

Modality of Assessment/Credit Structure

Theory Examination Pattern:

- A. Internal Assessment/Continuous Assessment**
Two Assignments of 25 marks each.
- B. External Examination-**
Course End Practical Exam: 50 Marks
Duration: Three hours
- C. Passing Marks: Individual passing of 40% in Internal and External**

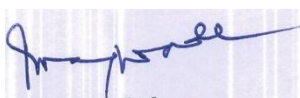
Justification for Certificate Course in RT-PCR

1.	The necessity for starting the course:	Certificate course in RT-PCR is necessary for those who seek to deepen their knowledge, specialize in a particular area of molecular biology with advanced careers in research, industry, molecular biology, cell biology, environment, or pharma related fields. It offers numerous opportunities for personal and professional growth, enabling you to make a positive impact on the world through scientific exploration and discovery.
2.	Whether the UGC has recommended the course:	Yes
3.	Whether all the courses have commenced from the academic year 2025-26	Yes, we plan to start them from the current academic year, 2025-26. under NEP 2020
4.	If the courses started by the University are self-financed, whether adequate number of eligible permanent faculties are available?	This course is self-financed. There is a requirement for a Course Coordinator, Technical Assistants and sweeper which is included in the budget provision of the course.
5.	To give details regarding the duration of the Course and is it possible to compress the course?	The duration of the program is two weeks. It is not possible to compress the course.
6.	The intake capacity of each course and no. of admissions given in the current academic year:	The intake capacity of the program is 20 (twenty) PG science students and 5 (five) from industry, per batch. Admissions for different batches for the academic year 2025-26 will be sought as per program schedule of the year.
7.	Opportunities of Employability or Employment available after undertaking these courses:	Certificate course students will have a wide range of employment opportunities across various sectors, biotechnology, molecular biology, medical diagnostic, environment and pharma industry. The skills and knowledge acquired during the course program will make them well-equipped for entry to the industry. Some of the common areas where these students can find employment include; Research and Development (R&D), medical diagnostic lab, forensic science, public health sector, pharmaceutical industry, molecular pharma, environmental, clinical research, regulatory affairs,

		Genetics, nanotechnology, teaching and academia, healthcare and clinical research etc. The key to employability for the students is to build a strong resume through hands-on experience in the RT-PCR, data analysis, and data interpretation which otherwise is not available for UG or PG students. Additionally, staying updated with the latest advancements in the field and continuously improving their skills can enhance their competitiveness in the job market.
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**Sign of the BOS
Prof. Vishwanath R. Patil
Chairman
BOS in Nanoscience &
Nanotechnology**



**Sign of the
Offg. Associate Dean
Dr. Madhav R. Rajwade
Faculty of Science &
Technology**



**Sign of the Offg. Dean
Prof. Shivram S. Garje
Faculty of Science &
Technology**