

This training program introduces the use of zebrafish (*Danio rerio*) as a model organism in biomedical research through a combination of theoretical and practical sessions. The course is mandatory for all students and researchers intending to conduct zebrafish-based studies at the Qatar University Zebrafish Facility, regardless of prior training received elsewhere. The program aims to ensure that participants understand the ethical, regulatory, and practical aspects of zebrafish research and are equipped to conduct studies responsibly and in accordance with institutional and international standards. Upon successful completion, participants will receive a certificate of completion. A copy of the certificate must be submitted with the relevant research protocol as part of the Qatar University Institutional Biosafety Committee (IBC) and Institutional Animal Care and Use Committee (QU-IACUC) approval process before initiating any zebrafish-related research activities.

Date and time: August 23rd – 27th 2026

Sessions: Each session will consist of a theoretical lecture followed by interactive demonstrations designed to reinforce key concepts and techniques. The practical components of the course provide an introduction to fundamental procedures and are intended to establish a foundational level of knowledge and skills. While successful completion of the course indicates that participants have met the training requirements, continued supervised practice and experience are recommended to further develop proficiency and confidence before independently applying these techniques in research settings. The workshop comprises a total of seven sessions.

Session 1: Introduction to Zebrafish as a Model Organism in Biomedical Research

Sunday, 23 August 2026 | 10:30 AM – 11:15 AM

This introductory lecture will provide participants with an overview of zebrafish-based research and the procedures implemented at the Biomedical Research Center (BRC). Topics include:

- Overview of BRC research activities and the Zebrafish Facility
- Biosafety requirements, ethical considerations in research, and zoonotic diseases
- Zebrafish (*Danio rerio*) as a model organism: advantages, limitations, and applications in biomedical research
- Overview of common experimental approaches and research areas utilizing zebrafish

The session will be delivered by Dr. Fusun D. Balli, Zebrafish Facility Manager, BRC.

Session 2: Gene Editing in Zebrafish Disease Modeling and Use of Microinjection Methods

Sunday, 23 August 2026 | 11:15 AM – 12:00 PM

This lecture will introduce participants to commonly used gene-editing and genetic manipulation approaches in zebrafish disease modeling. Topics include:

- CRISPR/Cas9-mediated genome editing
- Morpholino-based gene knockdown strategies
- Emerging genetic manipulation technologies and their applications
- Application of microinjection methods other than gene editing

The session will be delivered by Dr. Fusun D. Balli.

Question & Answer Session / Break

12:00 PM – 12:30 PM

Session 3: Requirements and Procedures for Conducting Zebrafish Research

Sunday, 23 August 2026 | 12:30 PM – 2:00 PM

This session will guide participants through the regulatory, ethical, and operational requirements associated with conducting zebrafish research. Topics include:

- Research protocol submission and approval processes
- Institutional Animal Care and Use Committee (IACUC) requirements
- Relevant Ministry of Public Health (MoPH) regulations
- Animal welfare standards, housing requirements, and humane care practices
- Accessing BRC facilities and establishing research collaborations
- Adapting experimental protocols to facility capabilities and operational requirements

Participants will also tour the Zebrafish Facility and observe embryo and adult experimental areas, as well as examples of commonly used research protocols.

The session will be delivered by Ms. Enas Al Absi, Zebrafish Facility Technologist, BRC.

Session 4: Zebrafish Husbandry – Principles and Practical Demonstration

Monday, 24 August 2026 | 10:30 AM – 1:00 PM

This session will introduce participants to the fundamental principles of zebrafish husbandry and facility practices. Topics include:

- Maintenance of zebrafish colonies
- Operation of recirculating aquatic systems
- Water quality monitoring and management
- Feeding practices and nutritional considerations
- Health assessment and routine monitoring

During the practical demonstration, participants will observe:

- Operation of the recirculating water system
- Feeding and breeding procedures for adult zebrafish
- Water quality testing and monitoring procedures
- Breeding setup and embryo collection procedures

The session will be delivered by Ms. Enas Al Absi.

Session 5: Practical Training in Microinjection Techniques and Embryo Monitoring

Tuesday, 25 August 2026 | 8:00 AM – 9:30 AM and 9:30 AM – 11:00 AM

This hands-on practical session will provide participants with introductory training in zebrafish embryo microinjection techniques. Topics include:

- Embryonic developmental stages
- Basic microinjection procedures
- Assessment of embryo viability and quality following injection

Participants will gain practical experience in:

- Zebrafish embryo microinjection
- Embryo collection, counting, sorting, and cleaning
- Monitoring embryo development at 24, 48, and 72 hours post-fertilization (hpf)

The session will be facilitated by Dr. Fusun D. Balli, Ms. Enas Al Absi, Mr. Ahmad Elwan (Zebrafish Facility Technologist, BRC) and Ms. Aseela Fathima (Zebrafish Facility Technologist, BRC).

Session 6: Monitoring and Assessment of Zebrafish Embryonic Development

Wednesday, 26 August 2026 | 10:30 AM – 2:00 PM

This session will focus on the proper handling, observation, and assessment of zebrafish embryos. Participants will be introduced to commonly used developmental and phenotypic assessment techniques, including:

- Microscopic evaluation of developmental stages
- Hatching and survival rate assessments
- Tail flick assays
- Phenotypic screening for developmental abnormalities
- High-speed video acquisition for cardiac function assessment
- Locomotor activity monitoring for behavioral studies

Participants will observe demonstrations of:

- Imaging and video recording of unhatched embryos for tail flick analysis
- Imaging and documentation of hatched embryos for phenotypic assessment
- Recording blood flow in major vessels for cardiac function analysis
- Behavioral recording for locomotor activity assessment

The session will be delivered by Dr. Fusun D. Balli, Mr. Ahmad Elwan, Ms. Enas Al Absi and Ms. Aseela Fathima.

Session 7: Data Analysis of Zebrafish Imaging and Video-Based Assays

Thursday, 27 August 2026 | 10:30 AM – 1:30 PM

This practical demonstration will introduce participants to data analysis workflows associated with the imaging and behavioral assays presented in Session 6. Topics include:

- Tail flick analysis using Noldus software
- Cardiac function assessment using ViewPoint ZebraLab software
- Behavioral and locomotion analysis using ViewPoint software platforms

Participants will gain an understanding of the principles, workflows, and interpretation of data generated from zebrafish developmental and behavioral studies.

The session will be delivered by Mr. Ahmad Elwan, Ms. Enas Al Absi and Ms. Aseela Fathima.