**Conducting TrainIng for the Illumina Miseq Sequencer**

1. **Purpose**

This procedure outlines the steps for training personnel to acquire the skills and knowledge necessary to run the Illumina MiSeq next generation sequencer from initial sample quality control to the review of sequencing run quality metrics.

1. **Scope**

This document applies to all staff that operate the Illumina MiSeq next generation sequencer and supervisors that oversee these operations. Training on the Illumina MiSeq sequencer is a four-step process that includes building a base of sequencing knowledge, observing the trainer perform the sequencing procedures, performing sequencing procedures under direct trainer supervision, and individually executing the sequencing procedures.

1. **Related Documents**

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| **Title** | **Document Control Number** |
| MiSeq Employee Training Form |  |
| MiSeq Trainer Designation Form |  |
| *“Lab-developed Risk Assessment/Mitigation document”* |  |

1. **Responsibilities**

| **Position** | **Responsibility** |
| --- | --- |
| All laboratory staff | * Complete all necessary training requirements |
| Team Lead | * Determine the training needs for the laboratory team * Ensure all staff are trained and evaluated according to this procedure * Designate the trainer by completing the MiSeq Trainer Designation Form * Create training plans, review training materials, and assign trainers as needed |
| Trainers | * Develop training materials * Train staff as directed by the Team Lead * Document training activities |
| Branch Chief | * Ensure applicable laboratory staff are accountable for completing all training and evaluation requirements described in this procedure * Review and approve this procedure |
| Quality Manager | * Review training documentation |

1. **Training Information Resources**
   1. *Reference your laboratory SOP or the Illumina SOP your laboratory uses here.*
   2. *Reference your laboratory-developed risk assessment/mitigation document here; this may be specific to the MiSeq or to the specific nucleic acid source.*
   3. Biosafety in Microbiological and Biomedical Laboratories, 5th Edition, HHS Publication Number (CDC) 21-1112.
   4. Illumina Support Training Videos *(select the videos relevant to your lab processes; add other videos as appropriate)* [**https://support.illumina.com/sequencing/sequencing\_instruments/miseq/training.html**](https://support.illumina.com/sequencing/sequencing_instruments/miseq/training.html)
      1. [**MiSeq: Introduction to the MiSeq System**](https://support.illumina.com/content/dam/illumina-support/courses/MiSeq_Intro_to_MiSeq_System/index.html?iframe)
      2. [**MiSeq: How to Start a Run**](https://support.illumina.com/content/dam/illumina-support/courses/MiSeq_How_to_Start_a_Run/story.html?iframe)
      3. [**MiSeq: Instrument Washes**](https://support.illumina.com/content/dam/illumina-support/courses/MiSeq_Instrument_Washes/story.html?iframe)
      4. [**TruSeq: Best Practices**](https://support.illumina.com/content/dam/illumina-support/courses/TruSeq_Sample_Prep_Best_Practices/index.html?iframe)
      5. [**TruSeq: Controls**](https://support.illumina.com/content/dam/illumina-support/courses/TruSeq_Controls/index.html?iframe)
      6. [**TruSeq: Sample Purification Bead Size Selection and Best Practices**](https://support.illumina.com/content/dam/illumina-support/courses/TruSeq_DNA_SPB_Handling_and_Best_Practices/story.html?iframe)
      7. [**Nextera DNA Sample Prep**](https://support.illumina.com/content/dam/illumina-support/courses/Nextera_Sample_Prep_Kits/index.html?iframe)
      8. [**Nextera Sample Prep: Best Practices**](https://support.illumina.com/content/dam/illumina-support/courses/Nextera_Sample_Prep_Best_Practices/index.html?iframe)
      9. [**Illumina Experiment Manager**](https://support.illumina.com/content/dam/illumina-support/courses/illumina-experiment-manager/story.html?iframe)
      10. [**MiSeq: Does My Run Look Good?**](https://support.illumina.com/content/dam/illumina-support/courses/MiSeq_Does_My_Run_Look_Good/story.html?iframe)
   5. Required Reading *(select the documents relevant to your lab processes; add other documents as appropriate)*
      1. Illumina MiSeq System User Guide
      2. TruSeq DNA Sample Preparation Guide
      3. Nextera DNA Sample Preparation Guide
      4. Preparing Libraries for Sequencing on the MiSeq
2. **Equipment/Materials**
   1. Illumina MiSeq Sequencer
   2. Library preparation and sequencing reagents
3. **Safety Precautions**
   1. All BSL-2 practices, safety equipment, and facility design must comply with the requirements listed in the most current version of Biosafety in Microbiology and Biomedical Laboratories.
   2. Appropriate PPE must be worn at all times when working in the laboratory, including laboratory coat, gloves, and safety glasses (if splashes are anticipated).
4. **Procedure**
   1. The trainee will build a basic understanding of MiSeq next generation sequencing (NGS) technology by:
      1. Reviewing the Illumina support training videos (5.4), and
      2. Completing the required reading (5.5).
   2. The trainer will perform all steps within the sequencing SOP in the laboratory while the trainee observes.
      1. The trainer will verbally walk the trainee through the entire sequencing process from beginning to end using the operational SOP as a training guide (**5.1**).
      2. This 1:1 review will cover initial sample quality control, preparing sample libraries, preparing the sequencing instrument, running the sequencing instrument, clean-up, and review of sequencing run quality control metrics.
   3. The trainee will perform all steps within the sequencing SOP under direct and full observation of the trainer.
      1. The trainer will quiz the trainee on multiple aspects of the protocol, including the questions below.
         1. What should be done when there is not enough DNA in the library prep?
         2. *Add additional questions the trainer should ask the trainee to determine level of understanding specific to your protocol.*
      2. The trainer will review the trainee’s quality control data as described in the sequencing SOP (5.1) to assess the competency of the trainee.
   4. Once the trainee successfully performs a sequencing run under the observation of the trainer, the trainee will perform an unaccompanied sequencing run.
      1. The trainer will review the trainee’s quality control data as described in the sequencing SOP (5.1) to assess the competency of the trainee.
   5. It is the responsibility of the primary user to ensure that preventative maintenance is scheduled and executed.
      1. The trainee will observe proper user performed preventive maintenance.
      2. The trainee will perform user performed preventive maintenance.
      3. The trainer will assess the trainee’s ability to properly maintain the instrument according to established maintenance procedures.
5. **Continued Learning**
   1. Trainers and primary users should regularly attend Illumina MiSeq webinars, read primary literature, and review new product releases.
   2. It is expected that trainers will try new protocols in the laboratory and teach new skills to primary users on a semiannual basis.
6. **Revision History**

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| --- | --- | --- | --- | --- |
| **Rev #** |  | **DCR #** | **Changes Made to Document** | **Date** |
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1. **Approval**

Approved By: \_\_\_\_\_\_\_ Date: \_

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Quality Manager / Designee

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