

NTHRYS

OPC PVT LTD

SECTION • MUT

Mutagenesis & Directed Evolution

Hands-on wet-lab training in deliberately changing sequence and function — site-directed mutagenesis, random and error-prone mutagenesis, saturation and library mutagenesis, directed evolution, gene and genome synthesis, and variant characterisation and analysis.

06

CATEGORIES

30

PROTOCOLS

MUT

SECTION ID

2026

EDITION

Categories & Protocols

Section **MUT** spans 6 category streams and 30 bench protocols. Every protocol carries a unique code for enrolment, tracking and certification.

MUT-SD	Site-Directed Mutagenesis QuikChange, overlap-extension & cassette SDM	05
MUT-RM	Random & Error-Prone Mutagenesis Error-prone PCR, chemical & strain mutagenesis	05
MUT-SA	Saturation & Library Mutagenesis Site-saturation, codon randomisation & libraries	05
MUT-DE	Directed Evolution Selection design, evolution cycles & DNA shuffling	05
MUT-GS	Gene & Genome Synthesis Oligo assembly, codon optimisation & error correction	05
MUT-AN	Variant Characterisation & Analysis Confirmation, activity & deep mutational scanning	05
TOTAL	All training protocols in section MUT	30

CODE FORMAT

MUT • **DE** • **01**

MUT section

DE category

01 protocol

01

■ CATEGORY · MUT-SD

Site-Directed Mutagenesis

QuikChange, overlap-extension & cassette SDM

05

PROTOCOLS

CODE

TRAINING PROTOCOL

DESCRIPTION

MUT-SD-01

QuikChange-Style SDM

Whole-plasmid point mutagenesis.

MUT-SD-02

Overlap-Extension PCR
Mutagenesis

Internal-mutation assembly.

MUT-SD-03

Primer Design for SDM

Mismatch-primer planning.

MUT-SD-04

Cassette Mutagenesis

Fragment-swap mutagenesis.

MUT-SD-05

Mutation Verification

Sequence-confirmed edits.

02

■ CATEGORY · MUT-RM

Random & Error-Prone Mutagenesis

Error-prone PCR, chemical & strain mutagenesis

05

PROTOCOLS

CODE

TRAINING PROTOCOL

DESCRIPTION

MUT-RM-01

Error-Prone PCR

Polymerase-induced diversity.

MUT-RM-02

Chemical Mutagenesis

Mutagen-driven changes.

MUT-RM-03

Mutator-Strain Mutagenesis

In vivo hypermutation.

MUT-RM-04

UV / Physical Mutagenesis

Radiation-induced lesions.

MUT-RM-05

Mutation-Rate Control

Tuning diversity levels.

03

■ CATEGORY · MUT-SA

Saturation & Library Mutagenesis

Site-saturation, codon randomisation & libraries

05

PROTOCOLS

CODE

TRAINING PROTOCOL

DESCRIPTION

MUT-SA-01

**Site-Saturation
Mutagenesis**

All-variants at a position.

MUT-SA-02

**Codon Randomisation (NNK
/ NNS)**

Reduced-redundancy codons.

MUT-SA-03

**Combinatorial Library
Construction**

Multi-site diversity.

MUT-SA-04

Degenerate-Primer Design

Mixed-base primer planning.

MUT-SA-05

**Library Diversity
Assessment**

Coverage & quality checks.

04

■ CATEGORY · MUT-DE

Directed Evolution

Selection design, evolution cycles & DNA shuffling

05

PROTOCOLS

CODE

TRAINING PROTOCOL

DESCRIPTION

MUT-DE-01

**Selection / Screening
Strategy Design**

Linking function to survival.

MUT-DE-02

Iterative Evolution Cycles

Mutate-select-amplify rounds.

MUT-DE-03

DNA Shuffling

Recombinative diversification.

MUT-DE-04

Staggered Extension (StEP)

In vitro recombination.

MUT-DE-05

Fitness-Based Selection

Enriching improved variants.



■ CATEGORY · MUT-GS

Gene & Genome Synthesis

Oligo assembly, codon optimisation & error correction



PROTOCOLS

CODE

TRAINING PROTOCOL

DESCRIPTION

MUT-GS-01

Oligo Assembly Gene Synthesis

De novo gene building.

MUT-GS-02

PCR-Based Gene Assembly

Overlap-assembly synthesis.

MUT-GS-03

Codon Optimisation for Synthesis

Host-tuned sequences.

MUT-GS-04

Error Correction in Synthesis

Mismatch-removal cleanup.

MUT-GS-05

Large-Construct / Genome Synthesis

Multi-kb assembly.



■ CATEGORY · MUT-AN

Variant Characterisation & Analysis

Confirmation, activity & deep mutational scanning



PROTOCOLS

CODE

TRAINING PROTOCOL

DESCRIPTION

MUT-AN-01

Mutant Sequencing & Confirmation

Variant verification.

MUT-AN-02

Functional Activity Assays

Effect-of-mutation testing.

MUT-AN-03

Structure-Function Analysis

Mapping mutation effects.

MUT-AN-04

High-Throughput Variant Screening

Parallel variant testing.

MUT-AN-05

Deep Mutational Scanning

Comprehensive variant mapping.

Engineer & evolve new functions

Every protocol in Section MUT is delivered as hands-on bench training — from precise site-directed edits through error-prone libraries, directed evolution, gene synthesis and deep variant analysis. Mutagenesis is how you ask a sequence to do something it has never done before.

30 protocols

6 categories

MUT section

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