

Molecular Biology Internship Topics

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51
Active Categories

155
Focused Areas

Internships
Internships

Molecular Biology Internship Categories

AI Gene Expression Regulation Research https://internships.nthrys.com/molecular-biology/ai-gene-expression-regulation-research	Machine Learning DNA Replication Research https://internships.nthrys.com/molecular-biology/machine-learning-dna-replication-research
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Bacterial Quorum Sensing Signal Analysis https://internships.nthrys.com/molecular-biology/bacterial-quorum-sensing-signal-analysis	DNA Methylation Pattern Epigenetic Study https://internships.nthrys.com/molecular-biology/dna-methylation-pattern-epigenetic-study
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Molecular Biology Internship Topics and Focused Areas

AI Gene Expression Regulation Research

- Machine Learning Models for Transcription Factor Binding Prediction
- CRISPR-Based Epigenetic Regulation and Gene Silencing Analysis
- Single-Cell RNA-seq Data Analysis for Cell-Type-Specific Gene Expression
- Non-Coding RNA Function in Post-Transcriptional Gene Regulation
- Synthetic Gene Circuits and Computational Modeling of Gene Networks

AI RNA Biology Molecular Research

- RNA Structure Prediction Using Machine Learning
- CRISPR RNA Design and Optimization
- RNA-Protein Interaction Prediction
- Single-Cell RNA Sequencing Data Analysis
- Non-coding RNA Functional Annotation

AI Protein Synthesis Research

- Deep Learning Models for Protein Structure Prediction
- Machine Learning-Driven Codon Optimization
- Natural Language Processing for Protein Sequence Analysis
- Computational Design of Novel Protein Functions
- AI-Assisted Protein Synthesis Pathway Optimization

AI DNA Damage & Repair Research

- Machine Learning Models for DNA Lesion Detection
- Predictive Modeling of DNA Repair Pathways
- Deep Learning Analysis of Gene Expression in Repair Responses
- Natural Language Processing for DNA Damage Literature Mining
- Bioinformatics Pipeline Development for Mutation Pattern Recognition

AI Cell Signaling Molecular Research

- Machine Learning Models for Protein-Protein Interaction Prediction
- Automated Image Analysis for Cell Signaling Microscopy
- Natural Language Processing for Biomedical Literature Mining
- AI-Driven Drug Target Discovery in Signal Transduction
- Systems Biology Modeling of Signal Transduction Networks

AI Protein-DNA Interaction Research

- Machine Learning Model Development for Protein-DNA Binding Prediction
- Structural Bioinformatics and Molecular Docking Studies
- Sequence Analysis and Motif Discovery in Transcription Factor Binding
- Deep Learning for ChIP-seq Data Analysis and Peak Prediction
- Comparative Genomics of DNA-Binding Proteins Across Species

CRISPR Gene Editing Mechanism Research

- CRISPR-Cas9 Off-Target Effects Analysis
- PAM Sequence Engineering and Specificity
- Base and Prime Editing Optimization
- CRISPR Delivery System Development
- Multiplexed CRISPR Array Design and Validation

Gene Therapy Vector Development Research

- Adeno-Associated Virus (AAV) Capsid Engineering
- Lentiviral Vector Optimization and Safety Assessment
- Non-Viral Vector Development and Transfection Efficiency
- In Vitro and Ex Vivo Gene Therapy Model Systems
- Vector Characterization and Quality Control Analytics

RNA Interference Therapeutic Development

- siRNA Design and Optimization
- Nanoparticle-Based siRNA Delivery Systems

- Gene Silencing Mechanism and Pathway Analysis
- Disease Model Development for RNAi Therapeutics
- Clinical Translation and Regulatory Assessment of RNAi Drugs

Molecular Marker Discovery Cancer Research

- Genomic Mutation Analysis in Tumor Samples
- Protein Biomarker Identification and Validation
- CircRNA and Long Non-coding RNA in Cancer Progression
- Epigenetic Markers: DNA Methylation and Histone Modifications
- Liquid Biopsy Marker Discovery from Circulating Tumor DNA and Exosomes

Enzyme Kinetics Optimization Laboratory Study

- Michaelis-Menten Kinetics Parameter Determination
- Enzyme Inhibition Mechanism Characterization
- Protein Expression and Purification Optimization
- Temperature and pH Effect Analysis on Enzyme Activity
- Multi-Substrate Enzyme Kinetics and Mechanism Studies

Synthetic Biology Genetic Circuit Design

- CRISPR-Based Gene Regulation Circuits
- Metabolic Engineering and Biosynthetic Pathways
- Synthetic Oscillators and Temporal Logic Gates
- Cell-Cell Communication and Quorum Sensing Circuits
- Protein Design and Enzyme Engineering for Circuit Applications

Mitochondrial DNA Mutation Analysis

- mtDNA Sequencing and Variant Detection
- Heteroplasmy Assessment and Quantification
- mtDNA Mutation Pathogenesis and Functional Analysis
- Population Genetics and mtDNA Polymorphism Databases
- Clinical Correlation and Disease Phenotyping

Protein Expression System Optimization

- Bacterial Expression System Optimization
- Mammalian Cell Culture-Based Protein Production
- Post-Translational Modification Engineering
- Recombinant Protein Purification and Characterization
- Heterologous Expression in Non-Conventional Hosts

Cell Cycle Regulation Checkpoint Research

- G1/S Checkpoint Control Mechanisms
- DNA Damage Response and G2/M Checkpoint
- Spindle Assembly Checkpoint Signaling
- Checkpoint Protein Interactions and Ubiquitin-Proteasome Degradation
- Checkpoint Dysfunction in Cancer Cell Biology

Plant Molecular Biology Improvement Study

- CRISPR-Cas9 Gene Editing in Crop Plants
- Stress Response Gene Expression Analysis
- Plant Metabolic Pathway Engineering
- Marker-Assisted Selection and Genomic Breeding
- Plant-Microbe Interaction and Symbiosis Studies

Epigenetics and Gene Regulation Research

- DNA Methylation Pattern Analysis
- Histone Modification Mapping
- CRISPR-Based Epigenetic Editing
- Long Non-Coding RNA Function in Gene Regulation
- Chromatin Accessibility and 3D Genome Organization

Virus Molecular Structure Characterization

- Viral Protein Crystallography and Structure Determination
- Cryo-Electron Microscopy (Cryo-EM) Analysis of Viral Particles
- Viral Genome Sequencing and Structural Prediction
- Viral Surface Antigen Epitope Mapping and Characterization
- Molecular Dynamics Simulations of Viral Protein-Ligand Interactions

Stem Cell Differentiation Pathway Investigation

- Pluripotency Marker Expression Analysis
- Epigenetic Modifications in Lineage Commitment
- Growth Factor Signaling Pathway Mapping
- Transcriptomic Profiling of Differentiation Stages
- Single-Cell Heterogeneity and Cell Fate Plasticity

DNA Methylation Pattern Epigenetic Study

- DNA Methylation Pattern Analysis in Cancer Cell Lines
- DNMT Enzyme Function and Inhibitor Screening

- Age-Related DNA Methylation Clock Development
- Environmental Factor-Induced Epigenetic Modifications
- Transgenerational Epigenetic Inheritance and DNA Methylation

Membrane Protein Structure Function Analysis

- G Protein-Coupled Receptor (GPCR) Ligand Binding Studies
- Ion Channel Electrophysiology and Patch-Clamp Analysis
- Transmembrane Protein Topology and Secondary Structure Prediction
- Protein-Lipid Interactions and Membrane Dynamics
- Structural Analysis of Transport Proteins and Antiporters

Horizontal Gene Transfer Microbial Study

- Bacterial Conjugation Pathway Analysis
- Metagenomic Sequencing of Environmental Microbial Communities
- CRISPR-Cas System Evolution and Transfer Dynamics
- Transposable Element Identification and Mapping
- Antibiotic Resistance Gene Dissemination Networks

Protein Post-Translational Modification Study

- Phosphorylation Mapping and Kinase Substrate Identification
- Ubiquitination and Protein Degradation Pathways
- Glycosylation Analysis and Protein Quality Control
- Acetylation and Histone Modification in Gene Regulation
- SUMOylation and Protein-Protein Interaction Networks

Antibiotic Resistance Mechanism Investigation

- Beta-Lactamase Enzyme Characterization and Inhibitor Screening
- Horizontal Gene Transfer Pathway Analysis
- Efflux Pump Function and Expression Regulation
- Whole Genome Sequencing and Comparative Genomics of Resistant Strains
- Phenotypic and Genotypic Resistance Pattern Profiling

Immunoglobulin Gene Diversity Research

- V(D)J Recombination Mechanism Analysis
- Somatic Hypermutation and Affinity Maturation
- Class Switch Recombination (CSR) Regulation
- Immunoglobulin Repertoire Sequencing and Analysis
- Allelic Exclusion and Isotypic Exclusion Mechanisms

Organelle Biogenesis Molecular Mechanism Study

- Mitochondrial Biogenesis and Quality Control Mechanisms
- Endoplasmic Reticulum Formation and Membrane Protein Trafficking
- Lysosomal Biogenesis and Autophagosome Maturation Pathways
- Peroxisomal Matrix Protein Import and Organellar Assembly
- Golgi Apparatus Stacking and Trans-Golgi Network Organization

Extracellular Matrix Protein Interaction Study

- Collagen-Integrin Binding Dynamics
- Proteoglycan Aggregation and Stability Analysis
- Laminin Isoform Characterization and Cell Recognition
- Matrix Metalloproteinase-ECM Substrate Specificity
- Fibronectin Conformational Changes and Mechanotransduction

Transcriptomics RNA-Seq Data Analysis

- RNA-Seq Read Alignment and Quality Control
- Differential Gene Expression Analysis
- Gene Annotation and Functional Enrichment Analysis
- Single-Cell RNA-Seq Data Processing and Cell Clustering
- RNA-Seq Visualization and Data Integration

Apoptosis Programmed Cell Death Pathways

- Caspase Activation and Signaling Cascades
- Mitochondrial Outer Membrane Permeabilization (MOMP)
- Death Receptor-Mediated Extrinsic Pathways
- p53-Dependent Apoptosis and Stress Response
- Apoptosis Evasion Mechanisms in Disease Models

Genomic Polymorphism Population Genetics Study

- SNP Genotyping and Allele Frequency Analysis
- Population Stratification and Ancestry Inference
- Linkage Disequilibrium Mapping and Haplotype Analysis
- Genome-Wide Association Study (GWAS) Data Analysis
- Evolutionary Population Genetics and Selection Signatures

Molecular Docking Drug Candidate Screening

- Virtual Screening of Small Molecule Libraries Against Target Proteins
- Structure-Based Drug Design and Ligand Optimization

- Protein-Ligand Interaction Analysis and Molecular Modeling
- High-Throughput Docking Pipeline Development and Validation
- Polypharmacology Prediction and Off-Target Analysis

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