



# ABSA INTERNATIONAL

*The Association for Biosafety and Biosecurity*

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## INTRODUCTION TO BIOSAFETY

### Molecular Biology Tools

*Biosafety Curriculum for Undergraduate and Graduate Students*

#### Imaging

- Light Microscopy
- Fluorescence Microscopy
- Electron Microscopy
- Computed Tomography (CT) (whole animal)
- X-Ray (whole animal)
- Positron Emission Tomography (PET) (whole animal)
- Nuclear Magnetic Resonance (NMR) (whole animal)

#### Nucleic Acid Sequence Identification and Determination

- Northern Blot
- Southern Blot
- Microarray
- Reverse Transcription
- Whole-genome sequencing/High-throughput Sequencing
- Sanger sequencing
- In vitro Transcription

#### Molecular Labeling

- Fluorescence labeling
- Radio-labeling
- Chemical labeling (HALO)

#### Protein-protein interaction identification and characterization

- Monoclonal Antibody production
- Western Blot
- Fluorescence Resonance Energy Transfer (FRET)
- Antibody/protein Array
- Immunoprecipitation
- Surface Plasmon Resonance
- Isothermal Titration Calorimetry
- Mass Spectrometry

#### Whole cell characterization, manipulation, and isolation

- Flow Cytometry
- Microscopy
- Tissue Culture
  - primary cell TC

- immortalized cell TC
- cell storage (long-term freezer stocks)
- Centrifugation
- Pipetting
- Spectrophotometry (use of Optical Density to determine cell density)
- Density gradient ultracentrifugation
- Streaking for isolation
- Cell lysis
- Protein extraction
- Nucleic acid extraction

### Genome-editing tools

- Restriction Digest (construct preparation)
- Ligation (construct preparation)
- Polymerase Chain Reaction (basic research, genotyping/diagnostics, and construct preparation)
- Nucleic acid (oligo) synthesis (construct preparation)
- CRISPR/Cas
- Cre/LoxP
- Transposons (delivery, interruption, and basic research)
- Homologous Recombination (delivery and interruption or replacement)
- Plasmids (delivery and basic research)
- Lentiviral vectors (delivery and basic research)
  - Design
  - Production/purification
  - Use
- Adenoviral vectors (delivery and basic research)
  - Design
  - Production/purification
  - Use
- Transfection (delivery)
- Electroporation (delivery)
- Natural Competency (delivery)