PDNA-7001 Virtual DNA Skills Training Course

This on-line virtual laboratory-based training program is designed to show students the fundamentals of molecular techniques including DNA extraction, amplification (using PCR), sequencing and interpretation. The course includes training in DNA technologies such as multiplex PCR, real-time PCR and use of the 3130xl automated sequencer and ABI 7000 real time PCR equipment.

Introduction: Virtual Tour Paleo-DNA Laboratory facility

Unit 1: Laboratory Practices

Unit 2: Sample Preparation

Unit 3: Extraction and Purification

Unit 4: Quantification

Unit 5: The Polymerase Chain Reaction

Unit 6: Gel Electrophoresis

Unit 7: Sequencing

Unit 8: Mitochondrial DNA

Unit 9: Short Tandem Repeats

Unit 10: The Y-Chromosome

Each unit is designed to follow the general process of the collection and preparation of a sample followed by the extraction and analysis of the DNA. The topics discussed will cover different types of samples that can be used for DNA analysis (buccal, hair, blood, bone) and the different preparation procedures required for each sample type. The participants will observe various DNA extraction methods applied to a variety of tissue types. DNA will be copied and analyzed using PCR (polymerase chain reaction), Multiplex PCR, Real-time PCR, Sequencing, and fragment analysis. Other techniques covered in the units include gel (Agarose and polyacrylamide) and capillary electrophoresis, measuring, centrifugation and pipetting. Participants will be shown how to analyze and interpret mitochondrial DNA, autosomal STRs (short tandem repeats), and Y-chromosome DNA.

The aim of the course is to provide students with an understanding of the concepts and theory of DNA analysis techniques; appreciate the laboratory practices associated with a variety of DNA analyses; and showcase practical DNA techniques available to a molecular biologist.

The learning outcomes of the course will be an understanding of the methods routinely used in DNA isolation, preparation and amplification; an understanding of the principles of DNA separation techniques; an understanding of the processes for data interpretation and the statistical evaluation processes associated with identity testing; and a familiarization with the range of historical and current DNA markers used in human identification.