Molecular Biology and Genetics
An overview of the discipline of genetics and equip students to work from basic principles to understand and appreciate both classical and modern molecular genetics. Advanced topics will include the increased understanding of the genetic basis/components in prevalent diseases, genetically engineered organisms and foods, the importance of knowing the complete DNA sequence of organisms including humans.

- **Instructor:** Dr Paul J. Bottino

**Module 1 DNA Structure and Replication Ch 1, 2, 6.**
DNA as the Genetic Material
Nucleic Acid Structure
Semi-conservative DNA replication

**Module 2 Transcription and Translation Ch 10.**
Initiation-Promotors and Enhancers
Elongation
Termination RNA Processing
Proteins, Protein Synthesis and the Genetic Code
Translation-Initiation, Elongation, Termination

**Module 3 Relationship Between Genes and Phenotypes Ch 3, 10.**
Mutations and Phenotypes
Gene Expression and Phenotypes
Biochemical Genetics-Altered Pathways

**Module 4 Regulation of Gene Expression Ch 11.**
The lac operon
The trp operon
Transcriptional Gene Regulation in Eukaryotes

**Module 5 Recombinant DNA and Molecular Analysis Ch 2, 12.**
Recombinant DNA
Cloning Vectors-small and large inserts
Cloning Strategies PCR Electrophoresis DNA and Protein
Blotting DNA Sequencing
Module 6 Applications of Recombinant DNA Technology Ch 2, 12
Repetitive DNA and Renaturation Kinetics
Eukaryotic DNA Packaging
Chromosome Structure
Whole Genome Organization

Module 7 Transposable Elements Ch 14.
Eukaryotic Transposons-Corn and Drosophila
Prokaryotic Transposons-Insertion Sequences, Composite Elements, Genetic Applications

Module 8 Genes and Cancer Ch 15.
Cell Cycle Regulation
Molecular Basis of Cancer
Genes that Influence Cancer
Etiology of Cancer

Module 9 Genes and Immunity Ch 3, 11.
The Immune Response
Antibody Structure
Antibody Genes
Immune System Malfunction

Module 10 Modern Forensics, Agriculture, Legal and Ethical Issues Ch 12.
The Human Genome Project
Genetic Testing-DNA Fingerprinting
Human Gene Therapy
Plant Biotechnology-Genetically Modified Crops
Legal and Ethical Issues in Genetics Recombinant DNA and Safety Genetically engineered foods.