The goals of this course are a comprehensive understanding of the mechanisms involved in molecular genetics and gene function and in-depth exploration of modern experimental analyses of these processes. Topics include DNA replication, repair, and recombination; transcription; epigenetic regulation of transcription; chromatin structure, histone modifications, transcription factors, and regulatory RNAs; long-range chromatin interactions and gene regulation; post-transcriptional gene regulation and translation; molecular biology based experimental analysis of gene function; and experimental genomic approaches to gene regulation and gene function. Prerequisites: MDTS 600 and MDTS 601 or instructor approval.

MDTS 805. Fundamentals of Cancer Biology. 3 Credits.
Course will cover molecular aspects of cancer including DNA damage, tumor viruses, cell cycle regulation, oncogenes and tumor suppressor genes and their respective roles in cancer prevention/development, genes involved in promoting or inhibiting metastasis, angiogenesis, telomerases and telomerase, regulation of both apoptosis and autophagy in normal and cancer cells, cancer stem cells, and diagnostic screening assays for therapeutic responses or resistance in cancer patients. Prerequisites: MDTS 600 and MDTS 601 or equivalents; instructor approval also required.

MDTS 810. Molecular Basis of Health and Disease. 3 Credits.
Emphasis is on human genetic syndromes and disorders associated with dysregulation of key signal transduction pathways that control gene expression, cell growth and protein synthesis including the Ras/MAPK pathway, tuberous sclerosis complex-mammalian target of rapamycin, PI3-kinase and others. Diagnosis, screening and treatment will be covered. Prerequisites: MDTS 600 and MDTS 601.

MDTS 814. Molecular Laboratory Rotation. 2,3 Credits.
Laboratory rotation with a pre-designated faculty member in which the student obtains hands-on experience. Designed for graduate students to sample different types of research models, techniques, and subject matter without the commitment of dissertation level involvement. Prerequisites: Graduate Program Director approval required.

MDTS 850. Molecular Genetics, Gene Function and Genomics. 3 Credits.
The goals of this course are a comprehensive understanding of the mechanisms involved in molecular genetics and gene function and in-depth exploration of modern experimental analyses of these processes. Topics include DNA replication, repair, and recombination; transcription; epigenetic regulation of transcription; chromatin structure, histone modifications, transcription factors, and regulatory RNAs; long-range chromatin interactions and gene regulation; post-transcriptional gene regulation and translation; molecular biology based experimental analysis of gene function; and experimental genomic approaches to gene regulation and gene function.

MDTS 895. Topics in Molecular Medicine. 1 Credit.
Student led presentations of current topics related to molecular medicine. Prerequisites: Instructor approval required.

MDTS 898. Molecular Biology Research. 3-6 Credits.
Supervised doctoral research in molecular diagnostics or biomedical studies. Prerequisites: MLRS 600 or MDTS 600 and MLRS 601 or MDTS 601; instructor approval required.