



MGM INSTITUTE OF HEALTH SCIENCES

(Deemed University u/s 3 of UGC Act, 1956)

Grade 'A' Accredited by NAAC

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Value Added Course

FUNDAMENTAL OF GENETICS

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Mahatma Gandhi Mission's
Medical College

Value Added Course
[Conducted by Dept of Paediatrics]

Fundamentals of Human Genetics

Introduction-

Genetics is not only genes but evolution of biology on Earth, evolution of mankind with the help of DNA. The master molecule DNA is simply the carbon, hydrogen, nitrogen and oxygen. But, the specific bonding amongst these elements has formed deoxynucleic acid (DNA) which has power to replicate, and has a blue print of every life in its own unique way. It won't be an overstatement, to say that 'it's a single fundamental element that defines life on earth'. The variations in the DNA sequence lead to specific characteristics which are normal but also can be disease causing.

Human genetics deals with study of chromosomes, DNA, RNA, proteins leading to inherited characteristics, which are physical, mental, normal and abnormal, in an individual, a family, a race or population.

The science of Genetics has progressed exponentially after human genome project in year 2003. We have mapped human genome which helps in understanding the genetic basis of characters, diseases and also helps in inventing new treatments for these diseases even at sub molecular level. We are on the brink of developing precision medicine, i.e. medicines based on genotype of particular individual. Gene therapy, Gene editing has already made success stories. As we are witnessing the next revolution in medicine as Genetics, it's imperative to provide knowledge, understanding, and application of genetics for human diseases. **The Fundamentals of Human Genetics course** will take all the students from basics to advances in Genetics and keep them updated about this field which is going to have tremendous impact on medical practice in recent future.

Course outline - 16 hours course spread over 2 months, every Saturday, 2-4pm

1. An introduction to human Genetics
2. The cell cycle
3. Understanding the chromosomes
4. Understanding the DNA, RNA and basis of inheritance
5. Modes of inheritance
6. Chromosomal Diseases
7. Developmental Genetics/ embryogenesis and organogenesis/ Dysmorphology
8. Biochemical Genetics- Inborn errors of metabolism- small molecule and large molecule Diseases, Hemoglobinopathies
9. Cancer genetics
10. Laboratory Genetics- Cyto-genetic and molecular genetics techniques for investigations in

11. Genetic counseling
12. Genetic Screening.

Week 1-

- A. Introduction 1. History of Medical Genetics 2. Genetic disorders- 1 hr
- B. Understanding the DNA and replication,
- C. Understanding transcription, translation, Gene
- D. Genotype, phenotype and mutations

Week 2-

- A. Genes in Pedigree- understanding terminologies.
- B. Patterns of genetic inheritance- Mendelian and non Mendelian

Week 3-

- A. Understanding the chromosomes
- B. chromosomal diseases- numerical and structural

Week 4-

- A. Cell Cycle, meiotic segregation ,Embryogenesis, organogenesis
- B. Congenital Malformations

Week 5-

- A. Biochemical Genetics-Inborn Errors of Metabolism- small molecule diseases
- B. Large molecule Diseases

Week 6-

- A. Hemoglobinopathies
- B. Cancer Genetics

Week 7-

- A. Laboratory Genetics-Cyto-Genetic and molecular Genetic diagnostic techniques
- B. Laboratory Visit

Week 8-

- A. Genetic Counselling
- B. Genetic screening

One pre-test and one post-test (50 one word questions- answers) on above topics, following which certificates can be given for completion of "Fundamental of Human Genetics Course"

Course Coordinator - Dr. Suvarna Magar