Sri Aurobindo University, Indore

Syllabus

Certificate Course in Medical Genetics

SRI AUROBINDO UNIVERSITY
VISION WITH ACTION

Sri Aurobindo Medical College and PG Institute, Indore

Title of the Course : **Certificate Course in Medical Genetics**

Duration of Course : Six Months

Aims, Objectives & Desirability of the Course:

Introduction:

Genetics is a rapidly advancing science and the major strides that medicine will accomplish in the present century will be made possible by understanding the human genome. The space of the progress is extremely rapid. If the benefit of this progress isto reach the common man the medical fraternity has to keep abreast of the newly emerging knowledge. The subject of **Medical Genetics** is not given due prominence in the medical curricula. To fill this lacuna the Sri Aurobindo Medical College and PG Institute at SAU, Indore wishes to establish a certificate course in Medical Genetics. It is envisaged that this course will arm the doctors and the technical people involved in care of patients and families with genetic disorders with the knowledge in genetics from basic concepts to the exciting future prospects like gene therapy.

Aims & Objectives

- To equip the participate now a strong background in the basic principles of genetics.
- To give additional insights that modern genetics has brought of this field.
- To help participants to came familiar with the language of genetics and the terminology of molecular biology.
- To provide participants with the ability to solve problems and think analytically.
- To sensitize the participants about the various common genetic conditions.
- To emphasize the participants about the significance of molecular diagnostics for various hereditary disorders.
- To involve the participants in short-term research projects.
- To equip the participants with the principles of genetic counseling.

Details of available teaching and infrastructural facilities and details of department conducting the course:

Required: Professor, Associate Professor, Assistant Professor

Qualifications:

Professor: MD in Medical field or Ph.D in life sciences (Biotechnology/Genetics) with 5 years experience in teaching/research in respective field

Associate Professor: MD in Medical field or Ph.D in life sciences (Biotechnology/Genetics) with 3 years experience in teaching/research in respective field

Assistant Professor: MD in Medical field, M.Sc. and Ph.D life sciences (Biotechnology/Genetics)

Other experts as visiting/guest faculty from various medical colleges and researchinstitutions can be involved.

Eligibility and syllabus proposed:

Eligibility: Candidates with MBBS / B.D.S / B.A.M.S / B.H.M.S /B. Pharmacy / BVSC/ B.Sc. (Nursing)/ M.Pharma are eligible. Educational qualification and experience in the field of medical sciences, life sciences, and clinical research. Even M.Sc life sciences or M.Tech in Biotech are eligible for the course.

Proposed Syllabus

Module	**Course Name**	**Theory /Practical**	**Number of sessions**
CCMG 01	Biochemistry and Cell Biology	Theory /Practical	8 x 2 hours (T) 20 x 2 hours (P)
CCMG 02	Research Methodology and Biostatistics	Theory	4 x 2 hours (T)
CCMG 03	Human Molecular Biology	Theory /Practical	8 x 2 hours (T) 20 x 2 hours (P)
CCMG 04	Human Genetics & developmental Biology	Theory /Practical	8 x 2 hours (T) 20 x 2 hours (P)
CCMG 05	Genetic basis of genetic disorders: Molecular Pathology	Theory	240 x 2 hours
CCMG 06	Ethical, Legal & SocialAspects of Human Genetics	Theory	4 x 2 hours

CCMG 07	Applied Medical Genetics (Diagnostic and other applications)	Theory / Practical	8 x 2 hours (T) 20 x 2 hours (P)
CCMG 08	Genetic Counselling	Theory /Practical	8 x 2 hours
	Project	Practical	25 x 4 hours

1. Introduction of the course

- Objectives
- Modules
- Assessment

2. Basics of Genetics

- Principles of Mendelian Genetics
- Relevance to Humans Genetics : Construction of Pedigrees
- Patterns of inheritance of genetic disorders (Autosomal, dominant, autosomal recessive, Sex-linked inheritance, Pseudoautosomal inheritance, Atypical patternsof inheritance, Mitochondrial inheritance)
- Structure of chromosomes, cell division Meiosis and mitosis

3. Basics of Human Molecular Biology

- Molecular and biochemical basis of nucleic acids
- Replication, Transcription and Translation
- Human genome
- Mutations : classification and DNA repair

4. Genetic disorders

- Single-gene disorders
- Chromosomal Abnormalities
- Common Autosomal disorders
- Common Disorders of Sex chromosomes
- Congenital abnormalities and multifactorial inheritance
- Dysmorphology
- Complex traits and adult onset diseases with a genetic predisposition
- Inborn Errors of Metabolism (Lysosomal storage disorders, Metabolic liver disease, Metabolic encephalopathies)
- Thalassemias and haemoglobinopathies (Haemophilias, Thrombophilias and otherhaematologic disorders)
- Neuromuscular disorders
- Endocrinopathies (CAH,CH)
- Ophthalmology disorders
- Dyslexias
- Speech therapy and Hearing Aid

- Autism
- Physiotherapy and occupational Therapy
- Pediatric surgical correction for surgical anamolies
- Skeletal dysplasias
- Connective tissue disorders
- Renal Disorders
- Cardiovascular Disorders
- Cancer Genetics

5. Applications of Genetics and Molecular Biology

- Screening methods (Newborn screening methods, Population screening Methods)
- Techniques in molecular biology (Molecular Analysis methods, Clinical Cytogenetic methods, Prenatal diagnostics)
- Principles and legal and ethical issues pertaining to community genetic services
- Social Problems related to Genetics
- Parent Groups
- Adoption
- Database and Internet searches

Hands on Training in Molecular Techniques in the Laboratory- duration of this module is 1 month

- Collection of samples from patients and controls
- Taking informed consent
- Universal biosafety precautions
- DNA/RNA isolations from: blood, tissue, fluid, FFPE block
- Setting up Polymerase chain Reactions along with variations of this technique
- PCR/Multiplex PCR
- Real –Time polymerase chain reaction experiments
- Sequencing
- New born Screening
- Microarray
- Documentation, interpretation and analysis of data
- Reporting of diagnosis
- Case scenarios and genetic counseling.

Proposed Text books:

First Author	Title	Publisher
Emery's	Elements of Medical Genetics	Elsevier
Nussbaum	Genetics in Medicine	Elsevier
Harper	Practical genetic counseling	Arnold
Jones	Recognizable patterns: human malformation	Elsevier
Emery and Rimoin	Principles and practice of medical genetics (3 volumes)	Churchill Livingston
Clarke Joe	Clinical basis of inborn errorsof metabolism	Cambridge University

Project work: Each student will complete a project of his/her choice during this period.

Evaluation:

Internal assessment: 50 marks

Project: 50 marks (* Minimum passing 50% in each head)

Course Structure:

Contact and online sessions and one month laboratory-based training in the Molecular Genetics laboratory of the department.

The following departments faculty will take the lecture of Medical Genetics course:

- Department of Molecular Biology and Medical Genetics (SAIMS, Indore)
- Department of Microbiology (SAIMS, Indore)
- Department of Pathology (SAIMS, Indore)
- Department of Biochemistry (SAIMS, Indore)
- Department of Community Medicine (SAIMS, Indore)