



Bangladesh Medical University
Department of Anatomy

Topic Distribution
Block- 6 (Advanced Genetics)

Prof. Dr. Laila Anjuman Banu

Topic	Specific learning objective
a. Genetic basis of disease development, Genetic counseling and related test for diagnosis of these diseases Familial adenomatous polyposis (FAP) Wilson disease Hypertrophic cardiomyopathy (HCM) Arrhythmia	Knowledge ○ describe the genetic basis of different types of cardiomyopathies and arrhythmia ○ describe the genetic basis of Familial adenomatous polyp (FAP), and Wilson's disease ○ explain the genotypic and phenotypic correlation among the relevant diseases ○ describe and explain the terms related to genetic counseling and ethics for relevant diseases ○ describe the outcomes of genetic counseling for relevant diseases ○ describe the social impact of genetic counseling for relevant diseases ○ explain the policies of genetic counseling for relevant diseases Skill ○ conduct genetic counseling sessions for relevant diseases ○ listen actively and ask questions sensitively to guide the patient and to clarify information ○ collect a comprehensive family medical history, construct an appropriate pedigree, and recognize patterns of inheritance ○ draw pedigrees accurately, including consanguinity loops and record appropriate information ○ provide information compassionately, being alert to and managing their emotional response (anxiety and antipathy, etc.) ○ communicate with patients and families about genetic information in a way that is respectful of cultural differences and non-judgmental, taking into account the patient's educational, socioeconomic, and ethnic backgrounds Attitude ○ demonstrate an appropriate attitude towards individuals with suspected genetic disorders and their relatives during conversation ○ deliver bad news appropriate to the understanding of the individual and his/her relatives and be able to support them ○ manage the emotional reactions of the patient ○ make timely, appropriate referrals to other specialists ○ recognize which patients will benefit from referral to psychological services ○ respect the autonomy of all patients but also offer assistance in decision-making when requested ○ inform patients and their families about the right patient resources and support, such as genetics support groups, local organizations, or other services that may be of use to them

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7.9.26*



Bangladesh Medical University

Department of Anatomy

Topic	Specific learning objective
b. Basic bioinformatics Application of Bioinformatics: PubMed GenBank Uniport c. Microarray d. DNA/RNA extraction from blood and tissue Quality and quantity of the extracted DNA/RNA using Nano Drop & Qubit Fluorometer e. Metagenomics f. Forensic testing g. Gene mapping	Knowledge ○ define and explain the terms related to Bioinformatics ○ describe the methods of OMIC technologies and their current and future applications ○ explain how to use bioinformatics databases, and modern techniques of data analysis ○ mention the different types of data found at the NCBI and EBI resources and explain how to locate and retrieve data from key bioinformatics databases and resources ○ understand the use of large data sets and “big data” ○ describe the importance of Bioinformatics ○ describe the role of ethical, legal, and social implications (ELSI) related to bioinformatics such as the use of genetic testing, storage and use of samples in biobank, and the associated clinical data ○ explain principles and technique of DNA and RNA extraction from blood and tissue ○ explain principles and technique of extracted DNA and RNA quantity and quality measurement using different instruments ○ define and explain the terms related to metagenomics ○ differentiate between traditional genomics and metagenomics ○ explain the principle of microbiome profiling ○ describe the concept of gut microbe characterization ○ describe the tools or techniques used in metagenomics ○ explain the principles of functional metagenomics and sequence-based metagenomics ○ describe the process of 16s-rRNA sequencing, shotgun sequencing clone-by-clone sequencing while mentioning its advantages and disadvantages ○ mention the principles and techniques of DNA fingerprinting ○ define and explain the concepts of gene mapping, linkage, and recombination ○ describe principles of genetic linkage analysis and association studies ○ explain the role of molecular markers (SNPs, microsatellites) in gene mapping ○ discuss different approaches of gene mapping including linkage, candidate gene, and genome-wide association studies (GWAS) ○ describe applications of gene mapping in disease gene identification and personalized medicine ○ Skill ○ locate and utilize the main databases at the NCBI and EBI resources ○ recognize the differentiation between databases, tools and repositories and be able to use each one to extract/retrieve specific information

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	○ extract/retrieve data from specific databases using accession numbers, gene names etc ○ apply selected tools at NCBI and EBI to perform basic analyses on genomic sequences ○ perform searching of database (Decipher & Ensembl) ○ extract DNA and RNA from blood and tissue ○ quantity and quality measurement of extracted DNA and RNA using different instruments ○ identify the parts of commonly used equipment in Genetics and explain their functions ○ perform the methods of sample processing in metagenomics ○ interpret the large metagenomic data set created from sequencing Attitude ○ develop an awareness of the importance of informed consent while collecting samples ○ recognize various tissues and possible testing techniques for laboratory diagnosis ○ behave sensibly in using laboratory equipment and materials in terms of the appropriate use of manual, economical use of materials as well as carefulness and cleanliness ○ take proper safety measures for oneself and the group as a whole while working in labs ○ keep the equipment and materials in their proper locations after use

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Bangladesh Medical University

Department of Anatomy

Topic Distribution

Block- 6 (Advanced Genetics)

Prof. Dr. Nahid Farhana Amin

Topic	Specific learning objective
a. Genetic basis of disease development, Genetic counseling and related test for diagnosis of these diseases COVID-19 (SARS-CoV-2) Diabetes mellitus (DM) <i>NFAmin 7.9.26</i>	Knowledge ○ describe the genetic basis of Diabetes mellitus and COVID-19 ○ explain the genotypic and phenotypic correlation among the relevant diseases ○ describe and explain the terms related to genetic counseling and ethics for relevant diseases ○ describe the outcomes of genetic counseling for relevant diseases ○ describe the social impact of genetic counseling for relevant diseases ○ explain the policies of genetic counseling for relevant diseases Skill ○ conduct genetic counseling sessions for relevant diseases ○ listen actively and ask questions sensitively to guide the patient and to clarify information ○ collect a comprehensive family medical history, construct an appropriate pedigree, and recognize patterns of inheritance ○ draw complex pedigrees accurately, including consanguinity loops and record appropriate information ○ provide information compassionately, being alert to and managing their emotional response (anxiety and antipathy, etc.) ○ communicate with patients and families about genetic information in a way that is respectful of cultural differences and non-judgmental, taking into account the patient's educational, socioeconomic, and ethnic backgrounds Attitude ○ demonstrate an appropriate attitude towards individuals with suspected genetic disorders and their relatives during conversation ○ deliver bad news appropriate to the understanding of the individual and his/her relatives and be able to support them ○ manage the emotional reactions of the patient ○ make timely, appropriate referrals to other specialists ○ recognize which patients will benefit from referral to psychological services ○ respect the autonomy of all patients but also offer assistance in decision-making when requested ○ inform patients and their families about the right patient resources and support, such as genetics support groups, local organizations, or other services that may be of use to them



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Topic	Specific learning objective
b. Sanger sequencing Principle and procedure Data analysis	Knowledge ○ define and explain the commonly used terms in cytogenetics and molecular genetics (with examples where required) ○ describe the principles and procedure of Sanger sequencing ○ define and explain the principle of Sanger sequencing (chain termination method) ○ describe the role of DNA polymerase, dNTPs, and ddNTPs in sequencing reactions ○ explain the steps of Sanger sequencing: template preparation, amplification, incorporation of ddNTPs, and detection ○ compare and contrast Sanger sequencing with other sequencing methods (NGS, whole genome sequencing) ○ describe the clinical and research applications of Sanger sequencing in mutation detection, validation, and genetic diagnosis ○ discuss the limitations of Sanger sequencing, including read length and throughput Skill ○ identify the parts of commonly used equipment in Genetics and explain their functions ○ perform sample preparation and PCR amplification for Sanger sequencing ○ carry out the sequencing procedure in the laboratory setting or simulated environment ○ interpret chromatograms to distinguish normal and abnormal sequences ○ critically evaluate Sanger sequencing reports in the context of genetic diagnosis Attitude ○ develop an awareness of the importance of informed consent while collecting samples recognize various tissues and possible testing techniques for laboratory diagnosis ○ behave sensibly in using laboratory equipment and materials in terms of the appropriate use of manual, economical use of materials as well as carefulness and cleanliness ○ take proper safety measures for oneself and the group as a whole while working in labs keep the equipment and materials in their proper locations after use

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Topic Distribution
Block- 6 (Advanced Genetics)

Dr. Latifa Nishat

Topic	Specific learning objective
a. Genetic basis of disease development, Genetic counseling and related test for diagnosis of these diseases Duchenne muscular dystrophy (DMD) Huntington disease	Knowledge ○ describe the genetic basis of Duchenne muscular dystrophy (DMD) and Huntington disease ○ explain the genotypic and phenotypic correlation among the relevant diseases ○ describe and explain the terms related to genetic counseling and ethics for relevant diseases ○ describe the outcomes of genetic counseling for relevant diseases ○ describe the social impact of genetic counseling for relevant diseases ○ explain the policies of genetic counseling for relevant diseases Skill ○ conduct genetic counseling sessions for relevant diseases ○ listen actively and ask questions sensitively to guide the patient and to clarify information ○ collect a comprehensive family medical history, construct an appropriate pedigree, and recognize patterns of inheritance ○ draw pedigrees accurately, including consanguinity loops and record appropriate information ○ provide information compassionately, being alert to and managing their emotional response (anxiety and antipathy, etc.) ○ communicate with patients and families about genetic information in a way that is respectful of cultural differences and non-judgmental, taking into account the patient's educational, socioeconomic, and ethnic backgrounds Attitude ○ demonstrate an appropriate attitude towards individuals with suspected genetic disorders and their relatives during conversation ○ deliver bad news appropriate to the understanding of the individual and his/her relatives and be able to support them ○ respect the autonomy of all patients but also offer assistance in decision-making when requested ○ inform patients and their families about the right patient resources and support, such as genetics support groups, local organizations, or other services that may be of use to them

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Topic	Specific learning objective
b. Cytogenetic Techniques Karyotyping Fluorescent in situ hybridization Spectral karyotyping (SKY) Chromogenic in situ hybridization (CISH) Comparative genomic hybridization	Knowledge ○ define and explain the commonly used terms in cytogenetics and molecular genetics (with examples where required) ○ mention the techniques for conventional chromosome analysis in different tissues ○ describe the types, steps of karyotyping, and mention its clinical application ○ describe the general principle and clinical applications of ISCN nomenclature ○ describe the clinical consequences of chromosomal rearrangements ○ describe and differentiate the steps, advantages, and applications of different advanced molecular genetic techniques (FISH, CISH, SKY, CGH, micro-array) ○ compare and contrast the indications and limitations of a G-banded karyotype, fluorescence in situ hybridization, and micro-array particularly concerning the detection of genomic copy number changes Skill ○ identify the parts of commonly used equipment in Genetics and explain their functions ○ interpret an idiogram ○ perform karyotyping and express the karyotype of a person from a given scenario ○ interpret the normal and abnormal reports using the International System for Human Cytogenetic Nomenclature (ISCN) ○ interpret the results of a cytogenetic report concerning numerical and structural chromosome abnormalities, and identify their clinical features, etiologies, and prognoses (e.g., Trisomies, Klinefelter syndrome, Turner syndrome, del 22q, del 5p, etc.) Attitude ○ develop an awareness of the importance of informed consent while collecting samples ○ recognize various tissues and possible testing techniques for laboratory diagnosis ○ behave sensibly in using laboratory equipment and materials in terms of the appropriate use of manual, economical use of materials as well as carefulness and cleanliness ○ take proper safety measures for oneself and the group as a whole while working in labs ○ keep the equipment and materials in their proper locations after use

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Topic Distribution
Block- 6 (Advanced Genetics)

Dr. Shafinaz Gazi	
Topic	Specific learning objective
a. Genetic basis of disease development, Genetic counseling and related test for diagnosis of these diseases Autism Down syndrome	Knowledge ○ describe the genetic basis of Autism and Down's syndrome ○ explain the genotypic and phenotypic correlation among the relevant diseases ○ describe and explain the terms related to genetic counseling and ethics for relevant diseases ○ describe the outcomes of genetic counseling for relevant diseases ○ describe the social impact of genetic counseling for relevant diseases ○ explain the policies of genetic counseling for relevant diseases Skill ○ conduct genetic counseling sessions for relevant diseases ○ listen actively and ask questions sensitively to guide the patient and to clarify information ○ collect a comprehensive family medical history, construct an appropriate pedigree, and recognize patterns of inheritance ○ draw complex pedigrees accurately, including consanguinity loops and record appropriate information ○ provide information compassionately, being alert to and managing their emotional response (anxiety and antipathy, etc.) ○ communicate with patients and families about genetic information in a way that is respectful of cultural differences and non-judgmental, taking into account the patient's educational, socioeconomic, and ethnic backgrounds Attitude ○ demonstrate an appropriate attitude towards individuals with suspected genetic disorders and their relatives during conversation ○ deliver bad news appropriate to the understanding of the individual and his/her relatives and be able to support them ○ manage the emotional reactions of the patient ○ make timely, appropriate referrals to other specialists ○ recognize which patients will benefit from referral to psychological services ○ respect the autonomy of all patients but also offer assistance in decision-making when requested ○ inform patients and their families about the right patient resources and support, such as genetics support groups, local organizations, or other services that may be of use to them

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Topic	Specific learning objective
b. NGS Principle and procedure Library preparation Data analysis <i>NFAmin 7.9.26</i>	Knowledge ○ define and explain the commonly used terms in cytogenetics and molecular genetics (with examples where required) ○ describe the principles of exome and genome sequencing ○ describe the principles and procedure of Next-generation sequencing (NGS) with mention their advantages and disadvantages ○ compare and contrast between Sanger sequencing and Next-generation sequencing (NGS) ○ mention the application of DNA-based testing for gene mapping, linkage, and mutation detection Skill ○ identify the parts of commonly used equipment in Genetics and explain their functions ○ perform the procedure of Next-generation sequencing (NGS) ○ interpret the large data set created from NGS Attitude ○ develop an awareness of the importance of informed consent while collecting samples ○ develop an awareness of the importance of informed consent while collecting samples recognize various tissues and possible testing techniques for laboratory diagnosis ○ behave sensibly in using laboratory equipment and materials in terms of the appropriate use of manual, economical use of materials as well as carefulness and cleanliness ○ take proper safety measures for oneself and the group as a whole while working in labs keep the equipment and materials in their proper locations after use



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Topic Distribution
Block- 6 (Advanced Genetics)

Dr. Sharmin Akter Sumi

Topic	Specific learning objective
a. Genetic basis of disease development, Genetic counseling and related test for diagnosis of these diseases Breast cancer Ovarian cancer Cystic fibrosis	Knowledge ○ describe the genetic basis of Breast cancer, Ovarian Cancer, Cystic Fibrosis ○ explain the genotypic and phenotypic correlation among the relevant diseases ○ describe and explain the terms related to genetic counseling and ethics for relevant diseases ○ describe the outcomes of genetic counseling for relevant diseases ○ describe the social impact of genetic counseling for relevant diseases ○ explain the policies of genetic counseling for relevant diseases Skill ○ conduct genetic counseling sessions for relevant diseases ○ listen actively and ask questions sensitively to guide the patient and to clarify information ○ collect a comprehensive family medical history, construct an appropriate pedigree, and recognize patterns of inheritance ○ draw complex pedigrees accurately, including consanguinity loops and record appropriate information ○ provide information compassionately, being alert to and managing their emotional response (anxiety and antipathy, etc.) ○ communicate with patients and families about genetic information in a way that is respectful of cultural differences and non-judgmental, taking into account the patient's educational, socioeconomic, and ethnic backgrounds Attitude ○ demonstrate an appropriate attitude towards individuals with suspected genetic disorders and their relatives during conversation ○ deliver bad news appropriate to the understanding of the individual and his/her relatives and be able to support them ○ manage the emotional reactions of the patient ○ make timely, appropriate referrals to other specialists ○ recognize which patients will benefit from referral to psychological services ○ respect the autonomy of all patients but also offer assistance in decision-making when requested ○ inform patients and their families about the right patient resources and support, such as genetics support groups, local organizations, or other services that may be of use to them

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Topic	Specific learning objective
b. Different types of Blotting Southern blot Western blot Eastern blot Northern blot Southwestern blot	Knowledge ○ define and explain the commonly used terms in cytogenetics and molecular genetics (with examples where required) ○ describe the principles and techniques of Southern blot, Western blot Eastern blot, Northern blot, Southwestern blot ○ compare and contrast the types of blotting in terms of methodology, target molecules, and applications ○ discuss clinical and research applications of blotting in genetic diagnosis, oncology, infectious disease, and molecular biology research Skill ○ identify the parts of commonly used equipment in Genetics and explain their functions ○ interpret results of blotting experiments including band patterns, intensity, and specificity Attitude ○ develop an awareness of the importance of informed consent while collecting samples recognize various tissues and possible testing techniques for laboratory diagnosis ○ behave sensibly in using laboratory equipment and materials in terms of the appropriate use of manual, economical use of materials as well as carefulness and cleanliness ○ take proper safety measures for oneself and the group as a whole while working in labs ○ keep the equipment and materials in their proper locations after use

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Topic Distribution
Block- 6 (Advanced Genetics)

Dr. Md. Mohiuddin Masum	
Topic	Specific learning objective
a. Genetic basis of disease development, Genetic counseling and related test for diagnosis of these diseases Haemophilia Sickle cell disease Thalassemia	Knowledge ○ describe the genetic basis of Hemophilia, Sickle cell anaemia, and Thalassemia ○ explain the genotypic and phenotypic correlation among the relevant diseases ○ describe and explain the terms related to genetic counseling and ethics for relevant diseases ○ describe the outcomes of genetic counseling for relevant diseases ○ describe the social impact of genetic counseling for relevant diseases ○ explain the policies of genetic counseling for relevant diseases Skill ○ conduct genetic counseling sessions for relevant diseases ○ listen actively and ask questions sensitively to guide the patient and to clarify information ○ collect a comprehensive family medical history, construct an appropriate pedigree, and recognize patterns of inheritance ○ draw complex pedigrees accurately, including consanguinity loops and record appropriate information ○ provide information compassionately, being alert to and managing their emotional response (anxiety and antipathy, etc.) ○ communicate with patients and families about genetic information in a way that is respectful of cultural differences and non-judgmental, taking into account the patient's educational, socioeconomic, and ethnic backgrounds Attitude ○ demonstrate an appropriate attitude towards individuals with suspected genetic disorders and their relatives during conversation ○ deliver bad news appropriate to the understanding of the individual and his/her relatives and be able to support them ○ manage the emotional reactions of the patient ○ make timely, appropriate referrals to other specialists ○ recognize which patients will benefit from referral to psychological services ○ respect the autonomy of all patients but also offer assistance in decision-making when requested ○ inform patients and their families about the right patient resources and support, such as genetics support groups, local organizations, or other services that may be of use to them

M. Masum
7.9.26



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Topic	Specific learning objective
b. PCR Sample preparation PCR run Restriction Fragment Length Polymorphism (RFLP) Conventional PCR Reverse transcription polymerase chain reaction (RT-PCR) c. Gel preparation, loading, electrophoresis and documentation	Knowledge ○ define and explain the commonly used terms in cytogenetics and molecular genetics (with examples where required) ○ describe the principles of sample preparation for the molecular genetic techniques in common usage- PCR, RT-PCR, RFLP ○ describe the principles and techniques of different types of PCR ○ define and explain the principle of PCR and its importance in molecular genetics ○ describe the components required for PCR (DNA template, primers, nucleotides, polymerase, buffer) and their roles ○ explain the steps of PCR: denaturation, annealing, and extension ○ describe the principle and applications of Restriction Fragment Length Polymorphism (RFLP) analysis ○ explain the procedure and uses of conventional PCR in genetic diagnosis and research ○ describe the principle and applications of Reverse Transcription PCR (RT-PCR) in gene expression studies ○ explain the principles of gel preparation, sample loading, electrophoresis, and visualization of amplified products ○ discuss advantages, limitations, and troubleshooting of PCR-based techniques ○ describe the principles and techniques of gel preparation, loading, electrophoresis and documentation Skill ○ perform gel load, gel electrophoresis of PCR amplified products, and gel documentation ○ perform different types of PCR ○ prepare DNA/RNA samples for PCR and assess their quality ○ perform PCR runs and optimize reaction conditions ○ carry out RFLP analysis and interpret fragment patterns for genotyping or mutation detection ○ perform RT-PCR for the detection of RNA and analysis of gene expression ○ prepare agarose gels, load samples, and perform electrophoresis for PCR products ○ document and interpret gel electrophoresis results Attitude ○ develop an awareness of the importance of informed consent while collecting samples recognize various tissues and possible testing techniques for laboratory diagnosis ○ behave sensibly in using laboratory equipment and materials in terms of the appropriate use of manual, economical use of materials as well as carefulness and cleanliness ○ take proper safety measures for oneself and the group as a whole while working in labs ○ keep the equipment and materials in their proper locations after use

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Bangladesh Medical University
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Topic Distribution
Block- 6 (Advanced Genetics)

Dr. Najnin Akhter

Topic	Specific learning objective
a. Genetic basis of disease development, Genetic counseling and related test for diagnosis of these diseases Turner syndrome Klinefelter syndrome (KS) <i>Najnin 7.9.26</i>	Knowledge ○ describe the genetic basis of Turner syndrome, Klinefelter syndrome, and Williams syndrome ○ explain the genotypic and phenotypic correlation among the relevant diseases ○ describe and explain the terms related to genetic counseling and ethics for relevant diseases ○ describe the outcomes of genetic counseling for relevant diseases ○ describe the social impact of genetic counseling for relevant diseases ○ explain the policies of genetic counseling for relevant diseases Skill ○ conduct genetic counseling sessions for relevant diseases ○ listen actively and ask questions sensitively to guide the patient and to clarify information ○ collect a comprehensive family medical history, construct an appropriate pedigree, and recognize patterns of inheritance ○ draw complex pedigrees accurately, including consanguinity loops and record appropriate information ○ provide information compassionately, being alert to and managing their emotional response (anxiety and antipathy, etc.) ○ communicate with patients and families about genetic information in a way that is respectful of cultural differences and non-judgmental, taking into account the patient's educational, socioeconomic, and ethnic backgrounds Attitude ○ demonstrate an appropriate attitude towards individuals with suspected genetic disorders and their relatives during conversation ○ deliver bad news appropriate to the understanding of the individual and his/her relatives and be able to support them ○ manage the emotional reactions of the patient ○ make timely, appropriate referrals to other specialists ○ recognize which patients will benefit from referral to psychological services ○ respect the autonomy of all patients but also offer assistance in decision-making when requested ○ inform patients and their families about the right patient resources and support, such as genetics support groups, local organizations, or other services that may be of use to them



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Topic	Specific learning objective
b. Primer designing and validation c. Recombinant DNA technology Hormone and vaccine development Gene therapy Personalized medicine	Knowledge ○ define and explain the commonly used terms in cytogenetics and molecular genetics (with examples where required) ○ define and explain the principles of primer design in PCR and molecular biology ○ describe parameters influencing primer design (GC content, melting temperature, primer length, specificity, secondary structures) ○ explain the significance of primer validation in ensuring accuracy of amplification ○ discuss the applications of well-designed primers in diagnostics, sequencing, cloning, and expression studies ○ describe the technologies used for recombinant protein production ○ describe the mechanisms how vaccine works and approaches of novel vaccine development ○ describe commonly used gene therapy vectors and their applications ○ describe mechanisms of using RNA for the treatment of human diseases ○ describe advanced technologies for genome editing and their potential application in treatment of human diseases ○ describe and explain the principles of personalized medicine Skill ○ design primers for specific target sequences ○ validate primer specificity through in silico PCR and sequence alignment Attitude ○ develop an awareness of the importance of informed consent while collecting samples ○ develop an awareness of the importance of informed consent while collecting samples recognize various tissues and possible testing techniques for laboratory diagnosis ○ behave sensibly in using laboratory equipment and materials in terms of the appropriate use of manual, economical use of materials as well as carefulness and cleanliness ○ take proper safety measures for oneself and the group as a whole while working in labs ○ keep the equipment and materials in their proper locations after use

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Bangladesh Medical University
Department of Anatomy

Topic Distribution
Block- 6 (Advanced Genetics)

Dr. Md. Zamilur Rahman

Topic	Specific learning objective
a. Genetic basis of disease development, Genetic counseling and related test for diagnosis of these diseases Acute myeloid leukemia (AML) Polycystic kidney disease (PKD) <i>NZM 7.9.26</i>	Knowledge ○ describe the genetic basis of Acute myeloid leukemia and Polycystic kidney disease ○ explain the genotypic and phenotypic correlation among the relevant diseases ○ describe and explain the terms related to genetic counseling and ethics for relevant diseases ○ describe the outcomes of genetic counseling for relevant diseases ○ describe the social impact of genetic counseling for relevant diseases ○ explain the policies of genetic counseling for relevant diseases Skill ○ conduct genetic counseling sessions for relevant diseases ○ listen actively and ask questions sensitively to guide the patient and to clarify information ○ collect a comprehensive family medical history, construct an appropriate pedigree, and recognize patterns of inheritance ○ draw complex pedigrees accurately, including consanguinity loops and record appropriate information ○ provide information compassionately, being alert to and managing their emotional response (anxiety and antipathy, etc.) ○ communicate with patients and families about genetic information in a way that is respectful of cultural differences and non-judgmental, taking into account the patient's educational, socioeconomic, and ethnic backgrounds Attitude ○ demonstrate an appropriate attitude towards individuals with suspected genetic disorders and their relatives during conversation ○ deliver bad news appropriate to the understanding of the individual and his/her relatives and be able to support them ○ manage the emotional reactions of the patient ○ make timely, appropriate referrals to other specialists ○ recognize which patients will benefit from referral to psychological services ○ respect the autonomy of all patients but also offer assistance in decision-making when requested ○ inform patients and their families about the right patient resources and support, such as genetics support groups, local organizations, or other services that may be of use to them



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Topic	Specific learning objective
b. CRISPR-Cas Technology	Knowledge ○ define and explain the commonly used terms in cytogenetics and molecular genetics (with examples where required) ○ define and explain the principles of CRISPR-Cas systems as genome editing tools ○ describe mechanisms of Cas proteins (e.g., Cas9, Cas12) in targeting and cutting DNA ○ explain guide RNA design and its role in CRISPR targeting ○ discuss applications of CRISPR in gene therapy, functional genomics, agriculture, and drug discovery ○ describe limitations and challenges of CRISPR including off-target effects and ethical concerns Skill ○ identify the parts of commonly used equipment in Genetics and explain their functions ○ perform in silico CRISPR target prediction using online databases and software Attitude ○ develop an awareness of the importance of informed consent while collecting samples ○ develop an awareness of the importance of informed consent while collecting samples ○ develop an awareness of the importance of informed consent while collecting samples recognize various tissues and possible testing techniques for laboratory diagnosis ○ behave sensibly in using laboratory equipment and materials in terms of the appropriate use of manual, economical use of materials as well as carefulness and cleanliness ○ take proper safety measures for oneself and the group as a whole while working in lab ○ keep the equipment and materials in their proper locations after use

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Bangladesh Medical University
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Topic Distribution
Block- 6 (Advanced Genetics)

Guest teacher (Prof. Dr. Khondker Manzare Shamim)

Topic	Specific learning objective
a. Ethical legal and social issues (ELSI) of modern human genetics b. Quality assurance (QA) and Quality control (QC) in the Genetic lab c. Overview of basic medical genetics <i>Manzar</i> <i>7.9.26</i>	Knowledge ○ describe and explain the terms related to bioethics ○ mention the purpose, scope, and benefits of bioethics ○ mention the principles of bioethics including medical ethics ○ describe the ethical issues related to human genome project ○ explain the ethical dilemma in genetic clinics ○ describe and explain the terms related to good laboratory practice (GLP), laboratory quality control and quality assurance (QC/QA) ○ describe the principles of Good Laboratory Practice (GLP) ○ describe the various aspects of quality control and assurance aspects of laboratory ○ mention the applications of QA in the field of genetics ○ mention the criteria of good Standard Operating Procedure (SOP) writing with the significance of it Skill ○ describe and explain the terms related to genetic counseling and ethics ○ describe the importance of the patient's background, culture, education, and preconceptions (beliefs, ideas, concerns, and expectations) to the process ○ recognize and execute approaches to fulfilling ethics advisory functions in practice settings Attitude ○ develop an awareness of the importance of informed consent while collecting samples