



## **MGM INSTITUTE OF HEALTH SCIENCES**

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

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# **Syllabus for M. Sc. Medical Biochemistry**



{Approved as per BOM. 23/2012, dated 30.03.2012, Item 4, MGMIHS, Navi Mumbai}

MGM Institute of Health Sciences

M.Sc. Medical Biochemistry

Syllabus (Theory & Practical)

Objectives:-

At the end of three year course in M.Sc. Medical Biochemistry the student should be able to:-

1. Gain knowledge of core fundamentals of Biochemistry.
2. Understand the working and application of instruments used in research and clinical Biochemistry laboratory.
3. Obtain in depth knowledge of biochemical basis of different diseases & disorders. So that they are prepared to conduct research in any of the subtopics.
4. Achieve basic orientation towards research methodology.
5. Be initiated in the field of laboratory medicine.
6. Conduct teaching, research and clinical assignment with expertise



Each semester is divided into six modules having ten lecture hours in each, making a total of 60 lecture hours per semester.

Semester I : Basic Foundation (Course I).

Semester II: Basic Foundation (Metabolism).

Semester III : Instrumentation & Research methodology.

Semester IV : Metabolism in Disease conditions & Nutrition.

Semester V : Applied Biochemistry & Laboratory Medicine.

Semester VI : Molecular Biology, Bioinformatics and Recent advances.



## M.sc. Medical Biochemistry Syllabus

### Semester- I

#### Basic Foundation Course-I

##### Module 1 ( 4 lecture hours)

Cell biology –Biophysical principles of Basic Sciences, Structure & function of different cell organelles, Separation of cell organelles, Markers for cell organelles, Structure & function of Cell membrane, Cytoskeleton elements, Transport mechanism, Ion channels, Artificial membrane ( liposome & it's applications)

##### Module 2( 10 lecture hours)

Chemistry of carbohydrates- Definition, Physiological functions, Classification, Monosaccharide, Disaccharides, Polysaccharides, Properties of carbohydrates, Epimers, Isomers. Mutarotation,

Chemistry of Lipids- Definition, Physiological functions , Classification of lipids, Fatty acids, Essential fatty acids, Simple lipids, Compound Lipids, Derived Lipids

##### Module 3( 10 lecture hours)

Chemistry of Protein-Amino acids & their classification, various ways of classification of protein, Structure of protein, Properties of proteins, Isoelectric pH, Denaturation, Biologically important peptides

Chemistry of Nucleic acids- Nucleosides, Nucleotides, Purine & Pyrimidine bases, Types & structure of DNA, Types & structure of RNA

##### Module 4 ( 5 lecture hours)

Enzyme-

Definition, Nomenclature & Classification- Systematic and recommended nomenclature. IUBMB classification of enzymes - main classes of enzymes only (names, definition, general reaction catalyzed and one example for each class).

Properties of enzymes- Mechanism of action of an enzyme with regard to its effect on activation energy of a reaction. Concept of active site in enzymes, Lock and key and induced fit models of enzyme-substrate binding. Specificity of enzymes- reaction and substrate specificity – definition and an example for each,

Cofactors - metals and coenzymes (definition, examples of coenzymes) and examples of enzymes that require them



Factors that influence enzyme activity -Effect of pH (concept of optimal pH with examples).  
Effect of temperature (concept of optimal temperature). Overview of concept of effect of  
substrate concentration (Michaelis- Menten equation [no derivation of equation required], basic  
concept of  $K_m$  and  $V_{max}$ ).  
Effects of enzyme and product concentration

Inhibition of enzymes- Types of enzyme inhibition - competitive, non-competitive, suicide  
inhibition. Examples of commonly used drugs that act by competitive inhibition of enzymes.

Regulation of enzyme activity- Overview of mechanisms involved in regulating the activity of  
enzymes, Allosteric activation and inhibition, Covalent modification – (phosphorylation and  
dephosphorylation) Induction and repression, Concept of feedback inhibition.

Isoenzymes, Therapeutic & diagnostic uses of enzymes

#### Module 5 ( 10 lecture hours)

Vitamins - Sources, RDA, Functions & deficiency manifestation of Fat soluble vitamins ( A,D,  
E,K), Water soluble vitamins (B complex & vitamin C)

Biological Oxidation - Role of ATP, The respiratory chain and oxidative phosphorylation,  
Inhibitors of electron transport chain and uncouplers of oxidative phosphorylation,  
Role of brown fat (non-shivering thermogenesis and role of uncoupling protein/ thermogenin).

Minerals- Sources, Function & Deficiency manifestation of Calcium, Phosphorus, Iron, Copper,  
Zinc, Magnesium, Manganese, Iodine, Sodium, Potassium, Fluoride, Selenium

#### Module 6( 6 lecture hours)

Hb Chemistry – Structure & functions of Hb, Physiological Hb, Abnormal HB, Hb derivatives

Hormone- Classification of hormones: Group 1 and Group 2 hormones.

Signal Transduction-Mechanism of intracellular signaling of hormones. G protein coupled  
receptors. Second messengers in hormone action: cAMP, cGMP,  $Ca^{2+}$  and phosphatidylinositol.  
Hormone receptors as gene-specific transcription factors

Seminar + Group Discussion= 15 hrs.

Total No. of Lecture hours for I<sup>st</sup> Semester- 60

M.sc. Medical Biochemistry Syllabus

Semester -II

Basic Foundation Course-2

Module 7( 8 lecture hours)

Carbohydrate Metabolism

Digestion of carbohydrates, Glucose transporters, Glycolysis, Rapaport-Leubering cycle, Citric acid cycle / Krebs' cycle / tricarboxylic acid (TCA) cycle, Pentose phosphate pathway (PPP), Glycogenesis, Glycogenolysis, Gluconeogenesis, Uronic acid pathway, Metabolism of galactose, Metabolism of fructose, Minor pathways of carbohydrate metabolism, Regulation of blood glucose levels, Diabetes mellitus, Glucose Tolerance Test (G T T).

Module 8( 7 lecture hours)

Lipid metabolism-

Digestion of lipids, Fatty acid oxidation, Biosynthesis of fatty acids, Metabolism in the adipose tissue, Metabolism of ketone bodies, Metabolism of cholesterol, Fatty liver, Atherosclerosis.

Module 9( 10 lecture hours)

Protein Metabolism-

Digestion and absorption, General pathways of amino acid catabolism (Transamination, Deamination, Decarboxylation, Transdeamination), Ammonia metabolism (Urea cycle, Glutamine formation), Metabolism of Glycine, Aromatic amino acids, Sulphur containing amino acids, Glutamic acid

Module 10( 7 lecture hours)

Nucleic acid Metabolism- Overview of the pathway of de novo synthesis of purine nucleotides (starting material and end products only - AMP and GMP).

Salvage pathway for purine bases and nucleosides. Lesch- Nyhan syndrome (cause and biochemical basis of clinical features).

Overview of the pathway of degradation of purines to form uric acid, including role of xanthine oxidase.

Hyperuricemia and gout (causes, clinical features, principles of treatment, including mechanism of action of allopurinol and probenecid).

Overview of pathway of de novo synthesis of pyrimidine nucleotides, showing only starting material, rate-limiting enzyme and end products.

Hb Metabolism- Heme synthesis, Heme degradation, Porphyria, Important physiological and pathological causes of jaundice in the newborn

Genetic Code-Characteristics (universal, unambiguous, degenerate, without punctuation [continuous/commaless]). Basis of degeneracy of the genetic code (wobble hypothesis).

Protein Biosynthesis- Prokaryotic & Eukaryotic Replication, Transcription, Translation (Initiation, elongation, Termination, Inhibitors of protein biosynthesis) in brief.

#### Module 11( 6 lecture hours)

Detoxification- Definition and examples, Biochemical importance of the two phases of xenobiotic metabolism. The cytochrome P450 enzyme system

Water & Electrolyte balance- Distribution of water in various body compartments. Intra- and extracellular fluid composition (sodium and potassium) , Blood volume and osmolality, Hormonal regulation of water balance & it's disorders.

Acid & Base balance- Definition of acid, base and buffer. Normal pH of body fluid and importance of maintaining normal pH, Sources of hydrogen ions in the body, Simple acid-base disorders, Mechanisms of regulation of pH

#### Module 12( 5 lecture hours)

Organ function Tests – LFT, RFT, TFT, PFT, GFT

Seminar + Group discussion= 17 hrs.

Total no of Lecture hours in Semester II - 60



M.Sc. Medical Biochemistry Syllabus

Semester –III

Instrumentation & Research Methodology

Module 13 (6 lecture hours)

Centrifuge, Colorimeter, Spectrophotometer (IR,UV/VIS), Flurimeter, Flame photometer

Module 14 (6 lecture hours)

Chromatography- Theory, Type, Principles & application of paper chromatography, TLC, Ion Exchange, Affinity Chromatography, Molecular Exclusion chromatography, Gas Liquid chromatography, HPLC, HPTLC

Module 15 (5 lecture hours)

Electrophoresis- Theory, Principles & Application of paper, Agar gel, Polyacrylamide gel, Immunoelectrophoresis, Isoelectric focusing.

Module 16 (5 lecture hours)

Electron Microscopy, Flow cytometry, Radio isotopic techniques, Nature of radioactivity

Detection & instruments, Applications of radioisotopes

Module 17 (5 lecture hours)

Research Methodology- Criteria for good research, Research design, Methods for data collection, Processing and analysis of data, Central tendency( Mean, SD,SEM,) Dispersion, Skewness, ANOVA, ANCOVA

Module 18 (5 lecture hours)

Research Methodology- Sampling techniques, Sample distribution, Type I type II errors, Z test, T test (paired & unpaired), Chi square test, goodness of fit.

Lab posting-16 hrs; Seminar and Group Discussion-12 hrs

Total no. of Lecture hours in Semester IV – 60



THIRD SEMESTER

RESEARCH METHODOLOGY AND BIO STATISTICS

Research Methodology

1. Introduction
2. - Research Design:-Correlational design, Experimental design, Internal & External validity, Threats to validity, components of research design, features of correlational & experimental design  
  
- Observational studies:- Exploratory studies, Descriptive studies, Explanatory studies, cohort studies, case-control studies, Evaluative studies, Monitoring studies, Historical studies, Panel studies.
3. Methods of data collection:  
Sample survey- Stages of sample survey  
    - Methods of survey  
  
Sampling & Non sampling errors.  
  
Interviewing for Data Collection  
    -Types of interviews  
    -Art of asking questions.  
  
Questionnaire construction  
    -Considerations of questionnaire construction  
    -Features of questionnaire  
  
Pre-test Interviews & Pilot studies



## Bio-Statistics

1. Introduction to statistics & Biostatistics & its application.
2. Data condensation & graphical methods.
  - Raw data, Attributes & variables, Discrete & continuous variables,
  - Principles of classification
  - Construction of frequency distribution, discrete & continuous frequency distribution, relative frequency distribution, cumulative frequency distribution.
  - Graphical presentation of data using: Histogram, frequency polygon, frequency curve, ogive curves.
  - Diagrammatic presentation of data using :simple bar diagram, multiple bar diagram, subdivided bar diagram, pie- diagram
  - Stem-leaf display
3. Measures of Central Tendency:
  - Need & features of good measure of central tendency.
  - Arithmetic mean, mode, median
  - Merits & demerits of mean, mode & median.
  - Graphical methods for mode & median.
  - Relation between mean, mode & median (Empirical Relation)
4. Measures of dispersion :
  - Need & characteristics of good measure of dispersion
  - Range, mean deviation, standard deviation, variance, C.V.
  - Merits & demerits of range, Mean deviation, Standard deviation, variance C.V.
  - Sampling variability & Significance, Hypothesis testing
  - Normal distribution & its properties, Hypothesis, Types of hypothesis, Type I error, Type II error, level of significance, P-value, one-tailed test, two tailed test.
  - Significance of difference in Mean & proportion for large samples & small samples.
  - SEM (Standard Error of Mean) uses & its applications
  - SEDM ( Standard Error of Differences in Means)
  - t-test –(paired t-test, unpaired t-test)
  - ANOVA
  - Chi-square test
  - Standard Error of Proportion (SEP) & Standard Error of Difference in Proportion (SEDP) & its uses and applications.
5. Vital Statistics:

M.Sc. Medical Biochemistry Syllabus

Semester -IV

Metabolism in Disease conditions and principles of nutrition

Module 19( 6 lecture hours)

Integration of carbohydrate, Protein & Lipid metabolism

Starvation metabolism; Starve & Fed cycle

Diseases of Carbohydrate Metabolism & Mucopolysaccharidosis

Diseases of Lipid Metabolism, CVD & Mucolipidosis

Module 20( 5 lecture hours)

Inborn errors of Metabolism: Diseases of protein metabolism, Diseases of Nucleotide metabolism & Hb metabolism

Module 21( 5 lecture hours)

Cell Cycle, Apoptosis, Cancer, Mitochondrial Diseases

Module 22( 5 lecture hours)

Endocrine disorders

Disorders of mineral metabolism, Water metabolism & its regulation.

Iron deficiency anemia

Module 23( 5 lecture hours)

Pathophysiology of specialized tissues-

Muscle, Bone, nerve, Vision, Collagen, Connective tissue

Module 24( 5 lecture hours)

Principles of Nutrition- Balanced diet & its planning, BMR, SDA, Calorimetry, Nutritive importance of various foods, Calorific value of foods, Diet management in different physiological/ Pathological conditions, Anthropometric techniques, obesity, PEM.

Lab Posting = 16 hrs; Seminar + Group Discussion= 12 hrs

Total no of Lecture hours in Semester III - 60



M.sc. Medical Biochemistry Syllabus

Semester -V

Applied Biochemistry & Laboratory Medicine

Module 25 (6 lecture hours)

Aging

Free radicals/Antioxidants in health & diseases

Environmental

Module 26 (6 lecture hours)

Reproductive Biology- Spermatogenesis, Menstrual cycle & Ovulation, Pregnancy, Lactation

Developmental Biochemistry- Embryonic development, Biochemical changes in fertilization & implantation, Erythropoiesis, Concept of stem cell.

Module 27 (7 lecture hours)

Immunology

Basic of Immunology- Antigen, Antibody, Primary response, Secondary response, Innate Immunity, Cell mediated immunity, Ag-Ab reactions, T & B Cells, MHC, Complement system, cytokines, ELISA, RIA.

Module 28 (6 lecture hours)

Applied Immunology -Acquired immunodeficiency syndrome (AIDS), Transplantation, Inflammation, Hypersensitivity reactions, Autoimmune disorders

Module 29 (7 lecture hours)

Laboratory Medicine- Part I

Body Fluids- Blood, Lymph, Bile, CSF, Urine, Synovial fluid, Gastric Juice, Saliva, Sweat, Teras, Profile test, diagnostics kits.

Module 30 (10 lecture hours)

Laboratory Medicine- Part II

Instruments used in clinical laboratory, Semi & Fully automated analyser, Chemiluminescence, Dry Chemistry, Good Clinical Laboratory Practice (Total Quality Management, Internal quality control, External quality control, Laboratory Accreditation)

Teaching Assignment-18 hrs.

Total no of Lecture hours in Semester V - 60

M.sc. Medical Biochemistry Syllabus

Semester –VI

Molecular Biology, Bioinformatics & Recent advances

Module 31 (6 lecture hours)

Molecular Biology- Replication, Transcription, Post transcriptional processing, Translation, Post translational modification & regulation

Module 32 (6 lecture hours)

Mutation & Repair of DNA & its associated diseases, Mitochondrial DNA & its diseases.

Module 33 (4 lecture hours)

Regulation of Gene expression, Positive & Negative regulations: Lac Operon, Arabinose Operon, Histidine Operon, Gene Mapping, Chromosomal walking

Genetic Engineering-

Recombinant DNA technology & its applications, restriction endonuclease, Plasmid, Cosmid, Gene Cloning, Gene library.

Module 34 (4 lecture hours)

Techniques in DNA analysis- DNA sequencing methods, PCR, RFLP, Blotting techniques, Hybridization, Microarray

Module 35 (4 lecture hours)

Bioinformatics- Biological sequence data bases, NCBI, Gene Bank, EMBL OMIM, database search algorithms ( BLAST, FASTA, Multiple sequence alignment)

Proteomics

Genomics

Module 36 (4 lecture hours)

Recent advances-

Human Genome Project, Molecular Diagnostics, Gene Therapy, Stem Cell Research

Research Assignment=32

Total no of Lecture hours in Semester V - 60

M.Sc. Medical Biochemistry

Practical syllabus

Semester-I

1. Test for Monosaccharides
2. Test for Disaccharides
3. Test for Polysaccharides & Osazone formation
4. Colour reaction of Proteins
5. Precipitation reactions of proteins
6. Urine: Physical Characteristics & normal constituents
7. Urine report: Physical Characteristics & abnormal constituents
8. Chemistry of Bile
9. Tests for Vitamin A & Vitamin C
10. Estimation of Serum Calcium
11. Estimation of Serum Phosphorus (inorganic)

Semester- II

1. Estimation of Blood Sugar
2. Estimation of Blood Urea
3. Estimation of Serum Creatinine
4. Estimation of Urine Creatinine
5. Estimation of Total proteins, albumin & A/G ratio
6. Estimation of Total Serum Bilirubin
7. Estimation of Serum Cholesterol
8. Estimation of Serum Uric Acid
9. Estimation of Serum Electrolytes
10. Estimation of Serum SGOT
11. Estimation of Serum SGPT
12. Estimation of Serum Alkaline Phosphatase
13. Estimation of Serum amylase



## M.Sc. Medical Biochemistry

### Practical syllabus

#### Semester-III

1. Chromatographic separation of Sugar
2. Chromatographic separation of Amino acids
3. Chromatographic separation of Urinary amino acids
4. Chromatographic separation of Plasma Lipids
5. Paper Electrophoretic separation of Plasma proteins
6. Polyacrylamide Electrophoretic separation of Plasma proteins
7. Agar Electrophoretic separation of lipoproteins
8. Agar Electrophoretic separation of LDH isoenzymes
9. Cellulose Acetate Electrophoretic separation of hemoglobin
10. Problems on Biostatistics

#### Semester-IV

1. Standardisation & Estimation of Blood Urea by different methods
2. Standardisation & Estimation of Serum Protein by different methods
3. Standardisation & Estimation of Serum S.G.P.T./S.G.O.T by different methods
4. Standardisation & Estimation of Plasma Glucose by different methods
5. Standardisation & Estimation of Serum Uric acid by different methods
6. Standardisation & Estimation of Serum Creatinine by different methods
7. Estimation of Fe & TIBC
8. Estimation of VMA
9. Isolation of Casein from milk
10. Isolation of Starch from Potato
11. Isolation of Lycopene from Tomato
12. Isolation of Lecithin from Egg yolk

## M.Sc. Medical Biochemistry

### Practical syllabus

#### Semester-V

1. Estimation of Malondialdehyde (MDA)
2. Estimation of Superoxide Dismutase (SOD)
3. Estimation of Catalase (CAT)
4. Estimation of Vitamins: A, C & E
5. Estimation of Serum Lipid Profile
6. Estimation of Serum Cardiac Profile
7. Estimation of HbA1c
8. Gastric Function Tests
9. Liver Function Tests
10. Renal Function Tests
11. Demonstration on ELISA & RIA

#### Semester-VI

1. Isolation & Estimation of DNA, RNA
2. Demonstration on Polymerase Chain Reaction
3. SDS-PAGE technique for PCR Product
4. Demonstration on Restriction Fragment Length Polymorphism
5. Demonstration on Northern & Western blotting techniques
6. Demonstration on Plasmid DNA isolation
7. Demonstration of RTPCR
8. Problem on Bioinformatics
9. Thesis Work

## M.Sc. Medical Courses

### Exam Pattern

The new suggested exam pattern which is common for all subjects is as follows.

- There will one final university exam at the end of every semester.
- Internal exam will be conducted at the college level for 1<sup>st</sup> and 2<sup>nd</sup> semesters with a common time table and for 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> semesters at the departmental level. The marks scored will be used for calculating the internal assessment as described on page 4, 5. .

Marks scheme for the University exam:

Final theory marks will be 80 marks (60marks University Theory exam + 20 Marks Internal assessment).

The existing University Theory exam pattern should be modified.as follows:

Existing Scheme:

Question	Mark distribution	Total marks (60)
Sec:A:MCQ	20X0.5M	10
Sec:B: SAQ	10/11 x 4M	40
Sec C: LAQ	1/ 2 x 10 M	10
		Total= 60 M

Modified scheme: ( This gives equal weightage to sec B and Sec C)

Question		Mark distribution	Marks allotted per section	Marks
Sec:A	MCQ	10X 1 M =10	10	10
Sec:B	SAQ	3/ 4 x 5 M =15	15	25
	LAQ	1/ 2 x 10 M =10	10	
Sec : C	SAQ	3/ 4 x 5 M =15	15	25
	LAQ	1/ 2 x 10 M =10	10	
				Total= 60 M

Final practical marks will be 70M.(50 marks University practical exam + 20 Marks Internal assessment)



Practical exam pattern : Total 50 marks with following break up.

Exercise	Description	Marks
Q No 1.	Practical exercise	15 M
Q No 2	Station exercise	5x 5M =25 M
Q No 3	VIVA	10 M
		Total= 50 M

Calculation of Internal assessment: there will be 20 marks each towards internal assessment in theory and practicals. This should be submitted by respective departments atleast 15 days before university exam to the university ( exam section)

Break up of Theory IA calculation for 20marks

Internal exam(at department)	10 marks
Attendance	5 marks
Seminar	5marks
	Total= 20 M

Break up of Practicals IA calculation:

Internal exam(at department)	10 marks
Attendance	5 marks
Journal	5marks
	Total= 20 M

Exam pattern for Internal exam Theory: ( 30 marks) to be converted to 10 marks.

Question	Mark distribution	Total marks (30)
Sec:A:MCQ	10 x1M	10
Sec:B: SAQ	2 /3 x 5M	10
Sec C: LAQ	1/ 2 x 10 M	10
		Total= 30 M

Exam pattern for Internal exam Practicals (30 marks) to be converted to 10 marks.

Exercise	Description	Marks
Q No 1.	Practical exercise	10 M
Q No 2	Station exercise	10 M
Q No 3	VIVA	10 M
		Total= 30 M

5 marks allocated for Attendance in theory and 5 marks for attendance in practicals.

It was decided that weightage be given to attendance as per following scheme:

Attendance percentage	Marks
<75	Zero
75	2.5
76-80	3.0
81-85	3.5
86-90	4.0
91-95	4.5
96-100	5.0

5marks for Seminar presentations ( to be added to theory internal assessment) and 5marks for Journal ( to be added to Practical Internal assessment).

**Regarding exam marks distribution in VI Semester (3 year courses)**

It was proposed that for the final semester ie 6<sup>th</sup> Sem in 3 year courses, the same mark distribution should be kept for practical exams.

Out of 50 marks practicals, break up will be as follows:

Exercise	Description	Marks
Q No 1.	Practical exercise	15 M
Q No 2	Dissertation presentation	25
Q No 3	VIVA	10 M
		Total= 50 M

#### Dissertation:-

M.Sc. (Medical Courses) student should submit a suitable dissertation topic forwarded by the guide to the School of Biomedical Sciences by 16<sup>th</sup> September in III Semester of the course. Following approval of ethics & scientific committee, work should be carried out.

Completed dissertation should be submitted by 31<sup>st</sup> march in VI Semester.







**Resolution No. 4.13 of BOM-55/2018: Resolved as follows:-**

- (i) Slow learners must be re-designated as potential learners.
- (ii) Students scoring less than 35% marks in a particular subjects/course in the 1<sup>st</sup> formative exam are to be listed as potential learners. These learners must be constantly encouraged to perform better with the help of various remedial measures.
- (iii) Students scoring more than 75% marks in a particular subjects/course in the 1<sup>st</sup> formative exam are to be listed as advanced learners. These learners must be constantly encouraged to participate in various scholarly activities.

All PG Courses  
admitted in AY 2018-19  
SBS

**Resolution No. 4.4.1.3 of BOM-55/2018:** Resolved to approve the revised syllabus of 'Research Methodology and Biostatistics' subject for all the PG courses (including 3 years) and to shift it in 2nd semester with effective from the batch admitted in the Academic Year 2018-19 onwards under MGM School of Biomedical Sciences. **[Annexure-13]**



Mansee Thakur &lt;mansibiotech79@gmail.com&gt;

Annexure-13

**To compulsorily include in the BOS agenda**

1 message

Registrar &lt;registrar@mgmuhs.com&gt;

6 September 2018 at 14:17

To: drravindrai@gmail.com, inamdar123456@gmail.com, ipseetamohanty@yahoo.co.in, jaishreeghanekar@gmail.com, drspravin22@gmail.com, dr\_spravin@hotmail.com, sudhirkul1979@gmail.com, mansibiotech79@gmail.com, sbsnm@mgmuhs.com, rajani.kanade@gmail.com, mgmschoolofphysiotherapy@gmail.com, prabhadasila@gmail.com, mgmnewbombaycollegeofnursing@gmail.com, gashroff2006@gmail.com, rupalgshroff@yahoo.com, manjushreeb@yahoo.com, drshobhasalve@gmail.com, spdubhashi@gmail.com, javantkarbhase@gmail.com, veenashatolkar@gmail.com, sharathcrisp@gmail.com, mgmipth@themgmgroup.com, anuradhamhaske@hotmail.com, principalconabad@gmail.com  
Cc: registrar@mgmuhs.com, mgmihsaurangabad@gmail.com, dr.rajeshkadam07@gmail.com, aradmin@mgmuhs.com

Dear Sir/Madam,

Please find attached herewith request from Dr. Rita Abbi, Professor, Biostatistics regarding Modification in the syllabus of 'Research Methodology and Biostatistics' subject and Proposal to make this subject compulsory in all the PG courses. You are requested go through this and include it in your agenda for forthcoming BOS in September, 2018.

Thanks and regards,

**Dr. Rajesh B. Goel**

Registrar

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Website: www.mgmuhs.com

**Modification in the syllabus of Research Methodology and Biosta.pdf**  
2261K



21-

MGM SCHOOL OF BIOMEDICAL SCIENCES, NAVI MUMBAI

(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)

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

Grade "A" Accredited by NAAC

Sector 1, Kamothe Navi Mumbai-410209, Tel.No.:022-27437631,27432890

Email. [sbsnm@mgmuhhs.com](mailto:sbsnm@mgmuhhs.com) / Website : [www.mgmsbsnm.edu.in](http://www.mgmsbsnm.edu.in)

To,  
The Director  
MGM School of Biomedical Sciences  
Kamothe,  
Navi Mumbai – 410 209

7-6-2018  
25

**Subject:** Modification in the syllabus of 'Research Methodology and Biostatistics'  
Subject and Proposal to make this subject compulsory in all the PG courses

Dear Madam,


Research Methodology and Biostatistics subject is a significant tool for academic research. It has been observed that majority of post graduate courses have this subject as a part of their course work. There is a need to modify the curriculum of 'Research Methodology and Biostatistics subject' due to the following reasons:

1. While going through the Research Methodology and Biostatistics syllabus it was found that in some courses more weightage was given to computer hardware e.g. History and development of computers(old pattern) which may not be needed now as we have witnessed the revolution in Information Technology. Students should be taught latest technology and software.
2. Secondly, in most of the syllabi 'Vital Statistic' is missing which is an important topic for healthcare field. Some of the essential topics like 'Normal distribution' etc are missing.
3. By streamlining the syllabus it will save teacher's teaching time, paper setting time. Moreover, Exam section need not call multiple examiners for the same subject, this will be economical for exam section.

This subject is well recognized as an essential tool in medical research, clinical decision making, and health management. It is recommended to streamline the syllabus and make **Research Methodology and Biostatistics' compulsory in all the post graduate courses of School Biomedical Sciences.** The modified syllabus is enclosed.

This is for your kind perusal and necessary action please.

With regards,

  
Dr. Rita Abbi  
Professor, Biostatistics

Copy for information to  
Registrar MGMIHS Navi Mumbai;  
✓ Hon'ble Vice Chancellor, MGMIHS Navi Mumbai  
Hon'ble Medical Director, MGM Medical College

*seen.*  
BOS → Faculty → Academic  
Council.

*27/6*

MGM Institute Of Health Sciences  
INWARD NO. 5720  
DATE: 25/6/18  
REF: TC

*27/6*  
*presenting to break*  
*All chairs persons of all boards*  
*27/6 12:30 - 1:00*  
*27/6*

**MGM INSTITUTE OF HEALTH SCIENCES**

**M. Sc. Students**

**Syllabus for Research Methodology and Biostatistics**

		No. of Hours	
<b>I. Research Methodology:</b>		Theory	Practical
1	<b>Scientific Methods of Research :</b> Definition of Research, Assumptions, Operations and Aims of Scientific Research, Research Process, Significance and Criteria of Good Research , Research Methods versus Methodology, Different Steps in Writing Report, Technique of Interpretation, Precaution in interpretation, Significance of Report Writing, Layout of the Research Report	5	—
2	<b>Research Designs:</b> Observational Studies: Descriptive, explanatory, and exploratory, Experimental Studies: Pre-test design, post-test design, Follow-up or longitudinal design, Cohort Studies, Case Control Studies, Cross sectional studies, Intervention studies, Panel Studies.	5	—
3	<b>Sampling Designs :</b> Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs (Probability sampling and non probability sampling), How to Select a Random Sample?, Systematic sampling, Stratified sampling, Cluster sampling, Area sampling, Multi-stage sampling, Sampling with probability proportional to size, Sequential sampling.	5	4
4	<b>Measurement in research:</b> Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools, Scaling Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques, Possible sources of error in measurement, Tests of sound measurement	5	5
5	<b>Methods of Data Collection:</b> Types of data, Collection of Primary Data, Observation Method, Interview Method, Collection of Primary Data	5	3
6	<b>Sampling Fundamentals :</b> Need and importance for Sampling, Central Limit Theorem, Sampling Theory, Concept of Standard Error, Estimation, Estimating the Population Mean Estimating Population Proportion, Sample Size and its Determination, Determination of Sample Size through the Approach Based on Precision Rate and Confidence Level.	5	3
<b>II. Biostatistics</b>			
1	<b>Data Presentation :</b> Types of numerical data: Nominal, Ordinal, Ranked, Discrete and continuous. Tables: Frequency distributions, Relative frequency, Graph: Bar charts, Histograms, Frequency polygons, one way scatter plots, Box plots, two way scatter plots, line graphs	3	4
2	<b>Measures of Central Tendency and Dispersion :</b> Mean, Median, Mode Range, Inter quartile range, variance and Standard Deviation, Coefficient of variation, grouped mean and grouped standard deviation (including merits and demerits).	3	4

3	<b>Testing of Hypotheses:</b> Definition, Basic Concepts, Procedure for Hypothesis Testing, Measuring the Power of a Hypothesis Test, Normal distribution, data transformation Important Parametric Tests, Hypothesis Testing of Means, Hypothesis Testing for Differences between Means, Hypothesis Testing for Comparing Two Related Samples, Hypothesis Testing of Proportions, Hypothesis Testing for Difference between Proportions, Hypothesis Testing for Comparing a Variance to Some Hypothesized Population Variance, Testing the Equality of Variances of Two Normal Populations.	6	
4	<b>Chi-square Test:</b> Chi-square as a Non-parametric Test, Conditions for the Application Chi-square test, Steps Involved in Applying Chi-square Test, Alternative Formula, Yates' Correction, and Coefficient by Contingency.	2	2
5	<b>Measures of Relationship:</b> Need and meaning, Correlation and Simple Regression Analysis	2	3
6	<b>Analysis of Variance and Covariance:</b> Analysis of Variance (ANOVA): Concept and technique of ANOVA, One-way ANOVA, Two-way ANOVA, ANOVA in Latin-Square Design Analysis of Co-variance (ANOCOVA), ANOCOVA Technique.	4	4
7	<b>Nonparametric or Distribution-free Tests:</b> Important Nonparametric or Distribution-free Test Sign test, Wilcoxon signed-Rank Test, Wilcoxon Rank Sum Test: Mann-Whitney U test Kruskal Walli's test, Friedman's test, and Spearman Correlation test.	3	4
8	<b>Vital Health Statistics:</b> Measurement of Population: rate, crude rate, specific rate, <i>Measurement of fertility:</i> specific fertility rate, Total fertility rate, <i>Reproduction rate,</i> Gross Reproduction Rate, Net Reproduction Rate, Measures related to mortality: Crude Death Rate (CDR) , Age-specific death Rate, Infant and child mortality rate, Measures related to morbidity.	4	6
9	<b>Computer Application</b> Use of Computer in data analysis and research, Use of Software and Statistical package. Introduction to SPSS. Importing data from excel, access, tab and comma separated files. Entering data, labeling a variable, coding and recoding a categorical and continuous variable. Converting data from string to numeric variables, sorting & filtering, merging, appending data sets. Frequencies, descriptive statistics, cross tabulations. Diagrammatic presentation include histogram, bar chart, pie chart, scatter diagram, box plot, line chart. Parametric test of hypothesis-one sample, Independent and paired sample t test, one way ANOVA & post HOC test. Testing for normality, Chi-square test with measures of association. Pearson correlation. Non parametric test	3	6
<b>Total hours</b>		60	60



**Resolution No. 3.1.4.2 of BOM-57/2019:**

- i.** Resolved to include “Gender Sensitization” into UG (from new batch 2019-2020) and PG (from existing batches) curricula. [**Annexure-21**]
- ii.** Resolved to align the module of “Gender Sensitization” with MCI CBME pattern for MBBS students.
- iii.** Resolved that Dr. Swati Shiradkar, Prof., Dept. of OBGY., MGM Medical College, Aurangabad will coordinate this activity at both campuses.

## **Annexure - 21**

**Gender sensitization for UG (2<sup>nd</sup> , 3<sup>rd</sup> , 8<sup>th</sup> semesters) and PG (3 hours)**

### **INCLUSION OF “ GENDER SENSATIZATION” IN CURRICULUM**

#### **Introduction :**

The health care provider should have a healthy gender attitude, so that discrimination, stigmatization, bias while providing health care will be avoided. The health care provider should also be aware of certain medico legal issues related with sex & gender.

Society particularly youth & adolescents need medically accurate, culturally & agewise appropriate knowledge about sex, gender & sexuality. So we can train the trainers for the same. It is need of the hour to prevent sexual harassment & abuse .

To fulfill these objectives, some suggestions are there for approval of BOS.

#### **Outline**

- 1)For undergraduates :- Three sessions of two hours each, one in 2<sup>nd</sup> term, one in 3<sup>rd</sup> term & one in 8<sup>th</sup> term.
- 2)For Faculties and postgraduates :- One session of two hrs .
- 3)For those want to be trainers or interested for their ownself, value added course, which is optional about sex, gender, sexuality & related issues.

### **Responsibility**

ICC of MGM, MCHA , with necessary support from IQAC & respective departments.

### **Details of undergraduate sessions**

#### **1)First session in 2<sup>nd</sup> term**

**Aim** – To make Students aware about the concept of sexuality & gender.

To check accuracy of knowledge they have,

To make them comfortable with their own gender identify & related issues.

To make them aware about ICC & it is functioning.

**Mode** – Brain storming , Interactive power point presentation experience sharing.

**Duration** – Around two hours

**Evaluation** – Feedback from participants.

#### **2)Second session in 3<sup>rd</sup> / 4<sup>th</sup> term**

**Aim** – To ensure healthy gender attitude in these students as now they start interacting with patients.

To ensure that the maintain dignity privacy while interacting with patients and relatives, particularly gender related.

To make them aware about importance of confidentiality related with gender issues.



To encourage them to note gender related issues affecting health care & seek solutions.

Mode – focused group discussions on case studies, Role plays & discussion.

--3--

Duration – Around two hours.

Evaluation – Feedback from participants.

Third session in 8<sup>th</sup> term.

**Aim** – To understand effect of gender attitudes on health care in various subjects.

To develop healthy gender attitude while dealing with these issues.

**Mode** – Suggested PBL by departments individually. ( In collaboration with ICC till faculty sensitization is complete)

**Evaluation** – Feedback

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**FOR POSTGRADUATES**

Session of 2-3 hrs preferably in induction program.

**Aim** – To introduce medically accurate concept of gender, sex, gender role & sex role.

To ensure healthy gender attitude at workplace.

To understand gender associated concepts on health related issues & avoid such bias while providing health care.

To make them aware about ICC & its functioning.

**Mode** – Interactive PPT

Role plays & discussion

**Duration** – 2 to 3 hrs

**Evaluation** – Feedback.

**FOR FACULTIES**

Session of 2 hours may be during combined activities.

**Aim** – To ensure clarity of concept about gender & sex.

To discuss effect of these concepts on health-related issues.

To identify such gender & sex-related issues in individual subject specialties.

To discuss methodology like PBL for undergraduate students when they are in 7<sup>th</sup>-8<sup>th</sup> semester.

**Mode** – Role play

    Focused group discussion

    Case studies

**Evaluation** – Feedback.

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Sdp-Pimple/joshi-obgy