

PARUL UNIVERSITY - FACULTY OF AYURVED

Department of Ayurved

SYLLABUS FOR 1st Year MS/MD PROGRAMME

Research Methodology and Medical Statistics (02200101)

Type of Course: MS/MD

Prerequisite:

Rationale:

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
Lect	Tut	Lab		External		Internal			
				T	P	T	CE	P	
100	-	100	-	100	100	-	-	-	200

Lect - Lecture, Tut - Tutorial, Lab - Lab, T - Theory, P - Practical, CE - CE, T - Theory, P - Practical

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	Introduction to Research (Paper 1 Part A Research Methodology): A. Definition of the term research B. Definition of the term anusandhan C. Need of research in the field of Ayurveda	%	
2	Definition of Statistics Paper 1 Part B Biostatistics): Concepts, relevance and general applications of Biostatistics in Ayurveda.	%	
3	DATA Preparation (Paper 1 Part B Biostatistics) Collection, classification, presentation, analysis and interpretation of data (Definition, utility and methods)	%	
4	General guidelines and steps in the research process (Paper 1 Part A Research Methodology): A. Selection of the research problem B. Literature review: different methods (including computer database) with their advantages and limitations C. Defining research problem and formulation of hypothesis D. Defining general and specific objectives E. Research design: observational and interventional, descriptive and analytical, preclinical and clinical, qualitative and quantitative F. Sample design G. Collection of the data H. Analysis of data. I. Generalization and interpretation, evaluation and assessment of hypothesis. J. Ethical aspects related to human and animal experimentation. K. Information about Institutional Ethics Committee (IEC) and Animal Ethics Committee (AEC) and their functions. Procedure to obtain clearance from respective committees, including filling up of the consent forms and information sheets and publication ethics.	%	
5	Research Proposal (Paper 1 Part A Research Methodology): Preparation of research proposals in different disciplines for submission to funding agencies taking EMR-AYUSH scheme as a model.	%	
6	Scales of Measurements - nominal, ordinal, interval and ratio scales (Paper 1 Part B Biostatistics): Types of variables – Continuous, discrete, dependent and independent variables. Type of series – Simple, Continuous and Discrete	%	
7	Measures of Central tendency (Paper 1 Part B Biostatistics): Mean, Median and Mode.	%	

8	Scientific writing and publication skills (Paper 1 Part A Research Methodology): A. Familiarization with publication guidelines- Journal specific and CONSORT guidelines. B. Different types of referencing and bibliography. C. Thesis/Dissertation: contents and structure D. Research articles structuring: Introduction, Methods, Results and Discussions (IMRAD)	%	
9	Classical Methods of Research (Paper 1 Part A Research Methodology): A. Concept of Pratyakshadi Pramana Pariksha, their types and application for Research in Ayurveda. B. Dravya-, Guna-, Karma-Parikshana Paddhati C. Aushadhi-yog Parikshana Paddhati D. Swastha, Atura Pariksha Paddhati E. Dashvidha Parikshya Bhava F. Tadvidya sambhasha, vadmarga and tantrayukti	%	
10	Variability (Paper 1 Part B Biostatistics): Types and measures of variability – Range, Quartile deviation, Percentile, Mean deviation and Standard deviation	%	
11	Probability (Paper 1 Part A Biostatistics): Definitions, types and laws of probability,	%	
12	Comparison between research methods (Paper 1 Part A Research Methodology): Comparison between methods of research in Ayurveda (Pratigya, Hetu, Uдахarana, Upanaya, Nigaman) and contemporary methods in health sciences	%	
13	Different fields of Research in Ayurveda (Paper 1 Part A Research Methodology): A. Fundamental research on concepts of Ayurveda B. Panchamahabhuta and tridosha. C. Concepts of rasa, guna, virya, vipak, prabhav and karma D. Concept of prakriti-saradi bhava, ojas, srotas, agni, aam and koshtha.	%	
14	Normal distribution (Paper 1 Part B Biostatistics): Concept and Properties, Sampling distribution, Standard Error, Confidence Interval and its application in interpretation of results and normal probability curve.	%	
15	Fundamentals of testing of hypotheses (Paper 1 Part B Biostatistics): Null and alternate hypotheses, type I and type 2 errors Tests of significance: Parametric and Non-Parametric tests, level of significance and power of the test, 'P' value and its interpretation, statistical significance and clinical significance	%	
16	Literary Research-Introduction to manuscriptology (Paper 1 Part A Research Methodology): A. Definition and scope, Collection, conservation, cataloguing B. Data mining techniques, searching methods for new literature; search of new concepts in the available literature C. Methods for searching internal and external evidences about authors, concepts and development of particular body of knowledge	%	
17	9. Drug Research (Laboratory-based) - Basic knowledge (Paper 1 Part A Research Methodology): A. Drug sources: Plant, Animals and Minerals, Methods of drug identification. B. Quality control and standardization aspects: Basic knowledge of Pharmacopoeial standards and parameters as set by Ayurvedic Pharmacopoeia of India, Information on WHO guidelines for standardization of herbal preparations, Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP).	%	
18	Univariate analysis of categorical data (Paper 1 Part B Biostatistics): Confidence interval of incidence and prevalence, Odds ratio, relative risk and Risk difference, and their confidence intervals	%	
19	Parametric Tests (Paper 1 Part B Biostatistics): 'Z' test, Student's 't' test: paired and unpaired, 'F' test, Analysis of variance (ANOVA) test, repeated measures analysis of variance	%	
20	Safety aspects (Paper 1 Part A Research Methodology): Protocols for assessing acute, sub-acute and chronic toxicity studies. Familiarization with AYUSH guidelines (Rule 170), CDCSO and OECD guidelines.	%	

21	Introduction to latest Trends in Drug Discovery and Drug Development (Paper 1 Part A Research Methodology): A. Brief information on the traditional drug discovery process B. Brief information on the latest trends in the Drug Discovery process through employment of rational approach techniques; anti-sense approach, use of micro and macro-arrays, cell culture based assays, use of concepts of systems biology and network physiology C. Brief introduction to the process of Drug development	%	
22	Non parametric methods (Paper 1 Part B Biostatistics): Chi-square test, Fisher's exact test, McNemar's test, Wilcoxon test, Mann-Whitney U test, Kruskal – Wallis with relevant post hoc tests (Dunn)	%	
23	Correlation and regression analysis (Paper 1 Part B Biostatistics): Concept, properties, computation and applications of correlation, Simple linear correlation, Karl Pearson's correlation co-efficient, Spearman's rank correlation, Regression- simple and multiple	%	
24	Clinical research (Paper 1 Part A Research Methodology): A. Introduction to Clinical Research Methodology identifying the priority areas of Ayurveda B. Basic knowledge of the following:- C. Observational and Interventional studies D. Descriptive & Analytical studies E. Longitudinal & Cross sectional studies F. Prospective & Retrospectives studies G. Cohort studies H. Randomized Controlled Trials (RCT) & their types I. Single-case design, case control studies, ethnographic studies, black box design, cross-over design, factorial design. J. Errors and bias in research K. New concepts in clinical trial- Adaptive clinical trials/ Good clinical practices (GCP) L. Phases of Clinical studies: 0,1,2,3, and 4. Survey studies- Methodology, types, utility and analysis of Qualitative Research methods, Concepts of in-depth interview and Focus Group Discussion	%	
25	Pharmacovigilance (Paper 1 Part A Research Methodology): Pharmacovigilance for ASU drugs. Need, scope and aims & objectives. National Pharmacovigilance Programme for ASU drugs.	%	
26	Sampling and Sample size computation for Ayurvedic research (Paper 1 Part B Biostatistics): Population and sample, Advantages of sampling, Random (Probability) and non random (Non-probability) sampling, Merits of random sampling, Random sampling methods- simple random, stratified, systematic, cluster and multiphase sampling, Concept, logic and requirement of sample size computation, computation of sample size for comparing two means, two proportions, estimating mean and proportions	%	
27	Vital statistics and Demography (Paper 1 Part B Biostatistics): Computation and applications - Rate, Ratio, Proportion, Mortality and fertility rates, Attack rate and hospital-related statistics	%	
28	Bioinformatics and Data Base: Introduction to bioinformatics, scope of bioinformatics, role of computers in biology. Introduction to Data base- Pub med, Medlar and Scopus. Accession of databases.	%	
29	Intellectual Property Rights (Paper 1 Part A Research Methodology): Intellectual Property Rights- Different aspect and steps in patenting. Information on Traditional Knowledge Digital Library (TKDL).	%	
30	Statistical software (Paper 1 Part B Biostatistics): Familiarization with the use of Statistical software like SPSS/Graph Pad	%	

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

List of Practical:

1. Pharmaceutical Chemistry (Research Methodology)

Familiarization and demonstration of common lab instruments for carrying out analysis as per API

2. Awareness of Chromatographic Techniques: Demonstration or Video clips (Research Methodology)

• Thin-layer chromatography (TLC). • Column chromatography (CC). • Flash chromatography (FC)
• High-performance thin-layer chromatography (HPTLC) • High Performance (Pressure) Liquid Chromatography (HPLC) • Gas Chromatography (GC, GLC)

3. Pharmacognosy (Research Methodology)

• Familiarization and Demonstration of different techniques related to:- • Drug administration techniques- oral and parenteral. • Blood collection by orbital plexuses puncturing. • Techniques of anesthesia and euthanasia. • Information about different types of laboratory animals used in experimental research • Drug identification as per API including organoleptic evaluation

4. Pharmacology and toxicology (Research Methodology)

Familiarization and demonstration of techniques related to pharmacology and toxicology

5. Clinical Biochemistry (Research Methodology)

Familiarization and demonstration of techniques related to basic instruments used in a clinical biochemistry laboratory – semi and fully automated clinical analyzers, electrolyte analyzer, ELISA-techniques, nephelometry. Demonstration of blood sugar estimation, lipid profiles, kidney function test, liver function test. HbA1c, cystatin and microalbumin estimation by nephelometry or other suitable techniques. Interpretation of the results obtained in the light of the data on normal values.

6. Clinical Pathology (Research Methodology)

Clinical Pathology: Familiarization and demonstration of techniques related to basic and advanced instruments used in a basic clinical pathology lab, Auto cell counter, urine analyzer, ESR, microscopic examination of urine.

7. Imaging Sciences (Research Methodology)

Familiarization and demonstration of techniques related to the imaging techniques. Video film demonstration of CT-Scan, MRI-scan and PET-scan

8. Clinical protocol development (Research Methodology)

Clinical protocol development

9. Statistical exercise

PARUL UNIVERSITY - FACULTY OF AYURVED

Department of Ayurved

SYLLABUS FOR 1st Year MS/MD PROGRAMME

Rasashastra Evam Bhaishajya Kalpana (02205101)

Type of Course: MS/MD

Prerequisite:

Rationale:

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
Lect	Tut	Lab		External		Internal			
				T	P	T	CE	P	
-	-	-	-	100	100	-	-	-	200

Lect - Lecture, Tut - Tutorial, Lab - Lab, T - Theory, P - Practical, CE - CE, T - Theory, P - Practical

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	Fundamental principles of Rasa Shastra and Bhaishajya Kalpana-Paper 2 Part A: Fundamental principles of Rasa Shastra and Bhaishajya Kalpana, introduction to Rasachikitsa, Ashuddha and Apakwa Bhasma- sevan Dosha and its management, introduction to Aushadha Sevan Kaal and Prayoga Marga (routes of administration).	%	
2	Ayurvedic Formulations-Paper 2 Part B: 1. Introduction to methods of analytical, toxicity, experimental and clinical validation of classical and proprietary Ayurvedic formulations.	%	
3	New dosage forms-Paper 2 Part B: Introduction to new dosage forms.	%	
4	Aushadha Yoga-Paper 2 Part A: Introduction to basic principles of Aushadha Yoga (formulations).	%	
5	Classification-Paper 2 Part A: Classification of Rasa Dravya - concept and relevance.	%	
6	Advance instruments-Paper 2 Part B: 3. Introduction to advance instruments of analysis like XRD, XRF, SEM-E-Dax, ICP analysis, Chromatography: TLC, gas chromatography, HPTLC, concept of Nanotechnology and its relevance to Aushadha-Nirman.	%	
7	Concept of Pharmacopoeia and Formulary-Paper 2 Part B: Concept of Pharmacopoeia and Formulary with introduction of 'The Ayurvedic Pharmacopoeia of India' (API) and 'The Ayurvedic Formulary of India' (AFI).	%	
8	Aushadha Nirmana-Paper 2 Part A: Introduction to principles of Aushadha Nirmana, concept of Shodhan, Marana, Jarana, Murcchhana, Sattvapatan and Amritikarana.	%	
9	Kalpanas-Paper 2 Part A: Concept of Kashaya, Panchavidha Kashaya and other Kalpana.	%	
10	Databases of medicinal plants-Paper 2 Part B: 5. Introduction to databases of medicinal plants published by CCRAS, ICMR and others.	%	
11	Rasashala-Paper 2 Part A: Concept of Rasashala, Rasa Mandapa with introduction to pharmacy in accordance with the Good Manufacturing Practices (GMP).	%	

12	Critical study of various texts-Paper 2 Part A: Critical study of Rasa Ratnasamuchchaya, Rasendra Chintamani, Rasa Tarangini, Sharnghadhara Samhita, Chakradutta and Bharat Bhaishajya Ratnakara with special reference to Aushadha-Nirmana.	%	
----	---	---	--

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

List of Practical:

- 1. Shodhan, Marana, Amritikarana of Rasa Dravya**
Shodhan, Marana, Amritikarana of Rasa Dravya (10 practicals)
- 2. Preparation of different dosage forms**
Preparation of different dosage forms (10 forms)
- 3. Pharmacopoeial standards of raw and prepared drugs**
Pharmacopoeial standards of raw and prepared drugs (20 practicals)
- 4. Raw Materials**
 - 1. Minerals and Metals**
 - Mineralogical Identification
 - Physical form - Crystal and Amorphous
 - Hardness on Moh's scale
 - Brittleness test
 - Fracture and Cleavage
 - Streak test
 - Luster
 - 1. Plant Material**
 - Macroscopic and Microscopic examination
 - Orgnaoleptic testing
 - Estimation of Foreign materials
 - Microbial load
 - Moisture content
 - Determination of ash value - total, water soluble and acid Insoluble ash
 - Specific gravity
 - Solubility- water and alcohol
 - Extract values- water and alcohol
 - TLC
 - Determination of optical density
 - Refractive index
 - Aflatoxins
 - Limit tests for heavy metals
 - pH estimation
- 5. Prepared dosage forms**

- **Rasaushadhi**

- a) Bhasma and Pishti Pariksha
- b) Determination of Particle size
- c) Limit tests for heavy metals
- d) Determination of moisture content, specific gravity, pH and acid value.

- **Kasthaushadhi**

a) Powders (Churna)

1. Particle size
2. Bulk density
3. Solubility
4. Estimation of Foreign material
5. Microbial load
6. Moisture content
7. Determination of ash value - total, water soluble and acid insoluble ash
8. Solubility - water and alcohol
9. Extract values - water and alcohol
10. TLC
11. Determination of Optical density
12. Refractive Index
13. Aflatoxins
14. Limit tests for Heavy metals
15. pH Value estimation

b) Tablets

1. Uniformity in weight and size
2. Tablet hardness
3. Tablet friability
4. Tablet disintegration
5. Tablet dissolution

c) Semisolid dosage forms

1. Moisture content
2. Sugar content
3. Microbial load

d) Liquids

1. pH value
2. Specific gravity
3. Determination of refractive index
4. Acid value
5. Viscosity
6. Saponification value
7. Iodine value