Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari Institute Of Medical Science And Health Care
Semester-2

Subject: Instrumentation and analytical techniques- PGDXX12402

Type of course: Minor

Prerequisite: Basic knowledge of Instrumentation and analytical techniques

Rationale: To critically review the elements of laboratory services that result in inappropriate ordering of Instrumentation and analytical techniques and the efficacy of corrective interventions.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
3	0	0	3	60	30	10	00	50	150

Legends. CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Sr. No	Course content	Hrs	% Weightage
1	**Chapter:1 Introduction to Instrumentation and Analytical Techniques** • Overview of medical laboratory instrumentation • Importance of analytical techniques in medical diagnostics • Basic principles of instrumentation in laboratory settings • Role of instrumentation in medical research and clinical practice.	15	25%

2	**Chapter:2 Basic Analytical Techniques** • Spectrophotometry: principles and applications in clinical analysis • Chromatography techniques: gas chromatography, liquid chromatography • Electrophoresis techniques: gel electrophoresis, capillary electrophoresis • Basic principles of mass spectrometry and its applications	15	25%
3	**Chapter: 3 Immunoassays and Molecular Diagnostics** • Principles of immunoassays: ELISA, radioimmunoassay, immunofluorescence • Nucleic acid-based techniques: PCR (Polymerase Chain Reaction), RT-PCR (Reverse Transcription PCR), DNA sequencing • Applications of immunoassays and molecular diagnostics in clinical laboratory settings	15	25%
4	**Chapter: 4 Laboratory Safety and Quality Assurance** • Importance of safety in the laboratory environment • Understanding and implementing laboratory safety protocols • Quality assurance measures in laboratory instrumentation • Compliance with regulatory standards and guidelines.	15	25%

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Instrument identification** Students need to identify provided instrument and define application of that instrument and upload it on GMIU web portal.	10
2	**Medical Survey** Students have to survey on given disease and prepare a report on that upload on GMIU web portal.	10
3	**Laboratory Demonstrations and Hands-On training of instrument** Students can observe the operation of various analytical instruments further students have the opportunity to operate the instruments themselves under supervision and photo will be upload on GMIU web portal.	10

4	**Laboratory Survey** Students have to visit pathogenic laboratory and analyze latest innovation in instruments commonly used in medical diagnostic and prepare a report and submit on GMIU web portal.	10
5	**Interactive Data Analysis Software Training** Students need to analyze medical data to make diagnostic or therapeutic decisions. Using software, commonly used for data analysis in medical laboratory settings. Analyzed data need to submit on GMIU web Portal.	10
Total		**50**

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	30%	30%	30%	10%	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Learn about medical laboratory instrumentation and Importance of analytical techniques in medical diagnostics.
CO2	Understand the basic principles of isolation and separation of biomolecules.
CO3	Analyze Immunoassays in Medical Diagnostics.
CO4	Application of Laboratory Safety and Quality Assurance

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

[1] Lehninger A.L -2012, Principles of Biochemistry,Freeman, W.H.& Com
[2] Godkar P.B., (2005), Textbook of Medical Laboratory Technology Vol 1 & 2, Bhalani Publications.
[3] Amitava Dasgupta; Amer Wahed (2014) Clinical Chemistry, Immunology and Laboratory Quality Control. Himmelfarb Health Sciences. ISBN: 9780124078215
[4] Kanungo R, (2017), Ananthanarayan and Paniker's Textbook of Microbiology, 10th Ed.