



UNITED STATES INTERNATIONAL UNIVERSITY

SCHOOL OF PHARMACY AND HEALTH SCIENCES

COURSE: **PAT 3373: CLINICAL CHEMISTRY**
CREDIT UNIT: Credit Units: 4.5

COURSE OUTLINE

Course Description.

This is an oral intensive course. The student will learn the nature of tissue and system organizations, the normal bodily processes and functions and the means of assessing anything outside the normal. The student will be expected to orally present clinical scenarios and the possible management options for patient's disorders.

Course Purpose

Clinical chemistry is an advanced course, the 3rd and last of your pathology series, which imparts you with knowledge on the diagnostic procedures for human conditions and the challenges inherent with the current diagnostic tools. This course aligns to **Sustainable Development Goal 3 (SDG 3) which aims to "ensure healthy lives and promote well-being for all across all ages"**. The course will only achieve this goal if you, as the learner, successfully become proficient in diagnostic tests which will go a long way in ensuring prompt and affordable resolution of disease conditions for everyone as envisaged in program learning outcomes 5 and 6.

Program Learning Outcomes:

By the end of their training the graduates should be able to:

1. Produce pharmaceutical products utilizing appropriate procedures and standards;
2. Manage a supply chain for pharmaceutical materials and products;
3. Apply regulatory and ethical instruments that govern the practice of pharmacy;
4. Design therapeutic management regimens for patients;
5. Disseminate knowledge on health related issues;
6. Participate in health research

UNIT CODE: PAT 3373 UNIT TITLE: CLINICAL CHEMISTRY

Prerequisites :

- **Specialized Tissue Metabolism BCM 2344**
- **Molecular Biology BCM 2346**

Expected Course Learning Outcomes:-

By the end of this course, the student should be able to;

1. Explain the role of clinical biochemistry laboratories in assisting in the investigation, diagnosis and treatment of diseases
2. Outline the physiological and biochemical role of the kidney
3. Describe the renal tests used to diagnose renal disease.
4. Describe the physiological and biochemical role of the liver
5. Describe the normal liver function tests.
6. Recognize and/or describe plasma protein functions and the disorders associated with protein defects
7. Discuss the relevance of biochemical, molecular and biological diagnostic tests in the investigation of disease.
8. Integrate the use of biochemical tests and explain their clinical significance in the assessment of various organ functions

Week	Topic	Subtopic
1	Introduction, Quality Assurance, Quality Control	Purpose of Clinical Biochemistry Tests; Types of Specimens for Chemical Analysis; Normal or Reference Values; Quality Assurance, Quality Control Class Exercise and Assignment: Determining PPV, NPV and cut-offs for clinical Tests
2	Renal function tests	Normal kidney functions Classification of renal function tests Tests of the glomerular function - renal clearance, GFR, serum creatinine and urea determinations Urine analysis and examination of kidney function Practical 1: Urine Analysis
3	Liver function tests	Recap Biochemical functions of the liver Classification of liver function tests Serum Bilirubin determination Rothera's test Total proteins Enzyme estimations as LFT ratio Practical 2: Liver Function Tests PBL clinical scenario on LFTs
4	Serum and Plasma Protein Assays	Preparation of Blood Samples- serum, plasma Types of Blood collection tubes Determination of Total Protein Concentration Determination of Plasma Protein Concentration Monoclonal Gammopathies Acute Phase Reactants Saturated FAs, TGs and Cholesterol Practical 3: Serum Cholesterol and TGs
5	Quiz I	
6	Laboratory Diagnostics in Gastroenterology	Gastric Function Pancreatic system Pancreatic enzyme tests

		Student Presentations on LFT PBL
7	MIDSEM EXAMS	
8	Thyroid function tests	Basic concepts of thyroid physiology Estimations of various thyroid hormones, their interpretations Recent methods of Thyroid function tests, PBL: Gastric and Thyroid Function
9	Cerebrospinal Fluid	Clinical Lab Tests on CSF
10	Body fluids Acid-base balance Electrolyte and water	Types and composition Collection and preservation of body fluids Quiz II PBL Presentation on Gastric and Thyroid Function
11	Balance Therapeutic Drug Monitoring (TDM)	Acidosis and alkalosis Osmolality and volume regulation Clinical applications. TDM in toxicology TDM in drug efficacy/overdose PBL Acidosis and Alkalosis
12	Cardiac biochemistry	Diagnosis of Cardiac conditions
13		PBL Presentation Acidosis and Alkalosis
14	End Semester Exams	

5.

TEACHING APPROACHES

Lectures, power point presentations, practicals, videos and class discussions: The instructor will give lectures in class to explain to the students various topics on clinical testing of patient samples. The lectures will take a participatory approach where the instructor will involve students by frequently asking them questions that are meant to keep them alert in class and trigger class discussions. The instructor will also be free to answer questions from the students in the course of the lectures.

Video shows on clinical diagnosis will be shown in class when available after the relevant topic has been covered.

Assignment criteria: Students will be given at least one research assignment on a relevant topic the instructor thinks is important and relevant to the course, but which will not be adequately covered in class due to limited time.

6. KEY INSTITUTIONAL AND ACADEMIC POLICIES

- Seven absences from class will result in an automatic grade F
- Integrity- **NEVER** sign in for someone who is absent
- **For the course to be considered complete every student should:**
 - Sit in for two quizzes,
 - Hand in all assignments (individual and group).
 - Attend all practical sessions and had in practical reports
 - Undertake all examinations (Mid semester, End semester, oral and Practical examination)
- Assignments should be done and submitted on the due dates shown

- No make ups are given for tests, assignments and exams
- All references used to do assignments should be cited correctly or the will be marked as plagiarized

No student will be allowed to sit for examinations if they show up 20 minutes after the examination has started or if another student has completed the exam and left the venue. (See the university policy).

Reference Core Texts

A. Core Texts

1. Bishop, M., Fody, E., Schoeff, L. (2017). Clinical Chemistry: Principles, Techniques, Correlations 8th Edition. Lippincott Williams & Wilkins. Philadelphia, USA. ISBN-10: 1496335589.
2. Sunheimer, R. and Graves, L. (2017). Clinical Laboratory Chemistry (Pearson Clinical Laboratory Science Series) 2nd Edition. Pearson. London, UK. ISBN-10: 0134413326.

B. References for Further Reading

1. Strasinger, S.K. and Di Lorenzo, M.S. (2014). Urinalysis and Body Fluids 6th Edition. F.A. Davis Company. ISBN-10: 0803639201.
2. Brunzel, N. (2017). Fundamentals of Urine and Body Fluid Analysis, 4th Edition. Saunders. ISBN-10: 0323374794.
3. Rodak, B. and Carr, J. (2016). Clinical Hematology Atlas, 5th Edition. Saunders. ISBN-10: 0323322492.
4. Mahon, C., Lehman, D., Manuselis, G. (2014). Textbook of Diagnostic Microbiology, 5e (Mahon, Textbook of Diagnostic Microbiology) 5th Edition. Saunders. ISBN-10: 0323089895.

Course Assessment;

Distribution of Marks

Attendance	10 %
Continuous Assessment /Quizzes (at least 2 sit in)	10 %
Group work/ Individual Assignment	10 %
Continuous Laboratory exercises	10 %
Oral examination	5 %
End semester Practical Exam	10 %
Mid-Sem Exam	20 %
Final Exam	25 %
Total	<u>100%</u>

Grading

90 – 100	A
87 - 89	A ⁻
84 - 86	B ⁺
80 - 83	B
77 - 79	B ⁻
74 - 76	C ⁺
70 - 73	C
67 - 69	C ⁻

64 - 66	D+
62 - 63	D
60 - 61	D-
0 - 59	F