Lyceum of the Philippines University  
College of Allied Medical Sciences  
Effective First Semester, A.Y. 2014-2015

SYLLABUS

Subject Code : CHEL05M  
Subject Titles : CLINICAL CHEMISTRY 1  
No. of Units : 4 units (3 units lecture and 1 unit laboratory)  
Lecture Hours/Week : 3 hours  
Laboratory Hours/Week : 3 hours  
Pre-requisite : ANATOMY AND PHYSIOLOGY, BIOCHEMISTRY

Course Description:

The course deals with the physiologically active soluble substances found in body fluids particularly blood. These involve the knowledge and the understanding of the basic concepts and principles of their metabolism, laboratory analyses and their diagnostic utility. The course also deals with instrumentation and evaluation of the accuracy and precision of the procedures using analytical techniques.

Program Objectives

➢ explain the different blood chemical constituents: their metabolism, functions, actions, laboratory techniques and principles, reference values and clinical significance, and variables or factors that may affect their determination.
➢ analyze and interpret laboratory test results
➢ apply concepts and principles of the various instruments used in the clinical laboratory
➢ prepare solutions of various concentrations correctly.
➢ discuss basic concepts of quality control and assurance, laboratory safety and proper waste disposal
➢ manifest the following values: Integrity, Honesty, Critical Thinking, Empathy and Value for Life.

Learning Goals

Upon completion of the course, the students shall be expected to:

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Learning Goals</th>
<th>Mission Deployment</th>
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</table>
| 1 Communication       | • To correctly convey meaningful ideas to the students regarding the subjects significant to their discipline.  
                        | • To promote comprehensive interpretations of the students in connection with the various ideas and theories related to their field of study. | 1,2,3              |
| 2 Information Retrieval & Evaluation | • Filter information regarding the roots of Medical Technology and its standards based on existing protocols and procedures.  
                                | • Solve problems regarding the Medical Technology practice via               | 1,3,5              |
the adoption of proper and correct ideas and theories.

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<td>3</td>
<td>Proactive and Spiritual Values</td>
<td>• Support a sustainable community extension program and be a catalyst for social transformation</td>
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</table>
| 4 | Teamwork and Leadership | • Convey comprehensively ideas and theories to a group setting  
• Develop individual leadership in order to create a holistic and competitive group |
| 5 | Creative and Analytical Thinking | • Evaluate complex information in order to establish simple yet appealing result/solution  
• Balance arguments via reasoning in order to obtain accurate and valid results |
| 6 | Computer Literacy | • Use computers and other technologies alike in order to attain accurate and scientific decision  
• Demonstrate the importance of ethics and morality in connection with using technologies to make one’s work easy and expeditious |
| 7 | Entrepreneurial | • Develop student’s skills in the promotion of businesses in the local and international sphere |

**Learning Objectives:**

1. **Affective**  
   1.1 Manifest the following values of integrity, honesty, critical thinking, empathy and value for life;

2. **Cognitive**  
   2.1 Acquire the knowledge about the different blood chemical constituents: their metabolism, functions, actions, laboratory techniques and principles, reference values and clinical significance, and variables or factors that may affect their determination;

3. **Psychomotor**  
   3.1 Perform laboratory procedures and tests with competence, precision, accuracy and reliability.

**Course Outline**

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Subject Matter</th>
<th>Outcome-Based Methodology</th>
<th>No. of Hrs./Weeks</th>
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Relate the VMO of LPU-CAMS to the course, inform the students of the class about rules and regulations, expectations and course requirements.

Describe the fundamental concepts in analytical procedure

<table>
<thead>
<tr>
<th>Topic</th>
<th>Activity</th>
<th>Week</th>
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<tr>
<td>1. <strong>Fundamental Concepts in Analytical Procedure</strong>&lt;br&gt;1.1 Units of Measurement&lt;br&gt;1.2 Preparation and Standardization of Solutions&lt;br&gt;1.3 Chemical Reagents and Laboratory Supplies</td>
<td>Powerpoint Presentation</td>
<td>2nd week (4.5 hrs)</td>
</tr>
<tr>
<td><strong>1.4 Laboratory Mathematics</strong></td>
<td>Problem solving of case encountered in Clinical Chemistry Laboratory</td>
<td>3rd week (3 hrs)</td>
</tr>
<tr>
<td></td>
<td><strong>2. Analytical Techniques and Instrumentation</strong>&lt;br&gt;2.1 Spectrophotometry&lt;br&gt;2.2 Electrochemistry&lt;br&gt;2.3 Electrophoresis</td>
<td>Powerpoint Presentation</td>
</tr>
<tr>
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<td><strong>2.4 Chromatography&lt;br&gt;2.5 Osmometry&lt;br&gt;2.6 Refractometry&lt;br&gt;2.7 Nephelometry</strong></td>
<td>Powerpoint Presentation</td>
</tr>
<tr>
<td></td>
<td><strong>PRELIMINARY EXAMINATIONS</strong></td>
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<td></td>
<td>2.8 Densitometry</td>
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</table>

Discuss the principle involved, reagents used, instruments used in chromatography, osmometry, refractometry and nephelometry

Enumerate their applications in clinical chemistry and in the diagnosis of diseases

Discuss the principle involved, reagents used, instruments used in

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Enumerate their applications in clinical chemistry and in the diagnosis of diseases
involved and the instruments needed in densinometry and in scintillation counting

Describe the applications of automation

Describe the principle involved in immunological techniques

Discuss proper specimen collection processing and handling

Differentiate the applications of vacutainers and the tubes with different anticoagulants

Define quality assurance

Illustrate computations of test results

Discuss the preparation and use of quality control charts

Show evaluation of methods used in maintaining quality assurance

2.9 Scintillation Counting

2.10 Automation

2.11 Immunochemical Techniques

3. Specimen Collection and Processing

3.1 Pre-Analytical Variables

3.2 Patient Preparation

3.3 Blood Collection, Processing and Handling

3.3.1 Vacutainers

3.3.2 Tubes and Anticoagulants

4. Quality Assurance

4.1 Definition of Terms

4.2 Computation

4.3 Preparation and Use of Quality Control Charts

4.4 Evaluation of Methods


Video Presentation of modern and automated clinical chemistry laboratories

Graded Recitation

Video Presentation of Specimen Collection using different examples of vacutainers and tubes in the order of draw

Reaction Paper of Students

PowerPoint Presentation

Group Discussion and Summary Report of Students

MIDTERM EXAMINATIONS

Discuss the laboratory determination of carbohydrates, its classification, metabolism, lab methods, reference values and clinical significance

5. Carbohydrates

5.1 Classification

5.2 Metabolism

5.3 Laboratory Methods of Determination

5.4 Reference Values

5.5 Clinical Significance

PowerPoint Presentation

Case Studies/Analysis

13th – 14th week

(7.5 hrs)

Discuss the laboratory determination of lipids, its classification, metabolism, lab methods, reference values and clinical significance

6. Lipids

6.1 Classification

6.2 Metabolism

6.3 Laboratory Methods of Determination

6.4 Reference Values

6.5 Clinical Significance

PowerPoint Presentation

Case Studies/Analysis

15th week

(3 hrs)

Discuss the laboratory determination of non-protein nitrogen, its classification, metabolism, lab methods, reference values and clinical significance

7. Non-Protein Nitrogen

7.1 Classification

7.2 Metabolism

PowerPoint Presentation

Case Studies/Analysis

16th – 17th week

(6 hrs)
References:

Henry, John Bernard, CLINICAL DIAGNOSIS AND MANAGEMENT BY LABORATORY METHOD 20TH EDITION.
Teitz, Norbert et.al. ed, David E. Bruns. TEITZ TEXTBOOK OF CLINICAL CHEMISTRY AND MOLECULAR DIAGNOSIS, 5TH EDITION. 2012
Bishop, Michael et al. CLINICAL CHEMISTRY: PRINCIPLES, PROCEDURES AND CORRELATIONS. 2013
Craig Lehman A. SAUNDERS’ MANUAL OF CLINICAL LAB. SCIENCES. 2010
Frankel, Sam, Reitman, Stanley, Sonnenwirt Alex, GRADWOHL’S CLINICAL LABORATORY METHODS AND DIAGNOSIS.
Ciulla, Anna & Lehman, Donald. SUCCESS! IN CLINICAL LABORATORY SCIENCE, 4TH EDITION. Pearson Education.

Multimedia References:

www.clinichem.org/
www.clinichem.org/content/by/year
www.degruyter.com/view/j/cclm
www.aacc.org/pbulications/clinical_chemistry
www.ibms.org/go/biomedical_science/../careers-clinical-chemistry

Course Requirements

1. Class Performance
   1.1 Activities
   1.2 Recitation/Class Participation, quizzes, seat works, projects
   1.3 Attendance – if incurred seven absences and one late (7.33), automatic Failure Due to Absences (FDA – three (3) lates/tardy marks is equal to one absent

2. Examinations
   2.1 Preliminary Examination
   2.2 Midterm Examination
   2.3 Final Examination
Grading System

Note: ALL requirements must be submitted on or before the given date.

<table>
<thead>
<tr>
<th>Grading Period</th>
<th>Exam</th>
<th>Prelim Grade</th>
<th>Midterm Grade</th>
<th>Final Period Grade</th>
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<tr>
<td></td>
<td>Prelim Exam</td>
<td>40%</td>
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<tr>
<td></td>
<td>Creative Academic Performance (CAP)</td>
<td>60%</td>
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<tr>
<td>Prelim Grade</td>
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<td>33.33%</td>
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<td>Midterm Grade</td>
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Final Grade 100%

Classroom Policies

1. Cheating plagiarizing - refer to student handbook
2. Medical absences - submit medical certificate to Clinic for notation
3. Completion procedures - refer to student handbook
4. Uniform guidelines - follow guidelines
5. Classroom decorum

Prepared and Updated by/Date: 

Validated by/Date: 

Endorsed by/Date: 

Approved by/Date: 

Faculty Member/s 

Industry Advisory Board 

Dean/Associate Dean 

Vice President for Academic Affairs/Executive Dean