King Saud University
College of Applied Medical Sciences
Department of Biomedical Technology
BMT-484   Automation in Clinical Laboratory   3 (2-1-0)

Current Instructor: Mohammad Nisar
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Textbook(s) and/or Other Required Materials:
Primary: Kory Ward, Cra, Lelmann Alan Leiken, "Clinical Laboratory Instrumentation and Automation" First Edition, Elsevier Limited, 1994.
- John G. Webster, Editor, "Medical Instrumentation Application and design", 3rd Edition, John Wiley & Sons, Inc., 1998
- Daniel C. Harris, "Quantitative Chemical Analysis" Seventh Edition, W. H. Freeman Company, 2006

Course Description (catalog):
In this course the cover topics are: Introduction of Automation, Experimental error and error analysis, emission and absorption spectroscopy, atomic spectrometric methods, Beer's law, Clinical laboratory instrumentation, automated chemical analysers, Synchron CX4, ACA, ROTO-CHEM, Lasers and applications in medicine, chromatography, Gas-Liquid Chromatography (GLC), High Performance Liquid Chromatography (HPLC), electrophoresis and applications, drug analysis: narcotics and dangerous drug, hematology, hematology analysis equipment: Coulter.

Prerequisites: None
Co-requisite: None

Course Type: Mandatory

Course Learning Outcomes:
Upon completing BMT224, students should have the following capabilities:
1. Understand the basic diagnostic techniques used in automated units.
2. Ability to use and understand the operation of automated units in a clinical laboratory.
3. Develop an ability to maintain and calibrate the units.

Student Outcomes Covered by Course:
a-   an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
The ability to understand basic techniques used in automated clinical laboratory units. Knowledge of emission and absorption spectroscopy.
b- an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
The ability to understand the basic mathematics, principles and procedures used in automated clinical laboratory units.

c- an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;

The ability to perform basic diagnostic techniques analyze the data interpret the outcome of experimental results, performs error analysis and statistics. Ability to maintain and calibrate the automated clinical laboratory units.

d. an ability to analyze, design, and implement biomedical systems, components or processes for broadly-defined engineering technology problems appropriate to program educational objectives.

e. an ability to function effectively as a member or leader on a technical team.

f. an ability to identify, analyze, and solve broadly-defined biomedical technology problems.
Covered

g. an ability to apply written, oral, and graphical communication in both technical and nontechnical environments; and an ability to identify and use appropriate technical literature.

h. an understanding of the need for and an ability to engage in self-directed continuing professional development.

i. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity.

j. a knowledge of the impact of engineering technology solutions in a societal and global context and an understanding of the clinical application of biomedical equipment.

k. a commitment to quality, timeliness, and continuous improvement.

Major Topics covered and schedule in weeks:
1. Introduction to Automation.
2. Experimental Error and error analysis.
3. Atomic spectrometric methods, Beer's law
4. Clinical laboratory instrumentation.
5. Automated chemical analysers, Synchron CX4, ACA, ROTO-CHEM.
6. Lasers and applications in medicine.
7. Chromatography, Gas-Liquid Chromatography (GLC), High Performance Liquid Chromatography (HPLC)
8. Electrophoresis and applications.
9. Drug analysis: Narcotics and dangerous drug.
10. Hematology, Hematology Analysis Equipment: Coulter.