HIBBING COMMUNITY COLLEGE
COURSE OUTLINE

COURSE NUMBER & TITLE: MLT 1425: Clinical Chemistry 1
CREDITS: 2 (2 Lec / 0 Lab)
PREREQUISITES: None

CATALOG DESCRIPTION:
Clinical Chemistry 1 covers detailed theory and representative laboratory analysis of carbohydrates, lipids and lipoproteins, proteins, clinical enzymology and metabolic analytes including ammonia, bilirubin, blood urea nitrogen, creatinine, and uric acid. Basic quality control concepts are introduced within the context of instrumentation and quality control.

OUTLINE OF MAJOR CONTENT AREAS:
I. Carbohydrates
II. Lipids and Lipoproteins
III. Proteins
IV. Clinical Enzymology
V. Metabolic Analytes
VI. Instrumentation

COURSE GOALS/OBJECTIVES/OUTCOMES:
Students will
1. discuss the symptoms of hypo and hyperglycemia.
2. characterize the following types of diabetes mellitus: type 1, type 2, and gestational diabetes mellitus.
3. discuss the acute and chronic complications associated with diabetes mellitus.
4. describe how the following laboratory tests are used in the evaluation of hypo and hyperglycemia: blood glucose, glycated hemoglobin (hemoglobin A_{1c}), and ketones.
5. discuss the role of self-monitoring devices for diabetics in the measurement of blood glucose.
6. state the criteria recommended by the American Diabetes Association for the diagnosis of diabetes mellitus.
7. describe the biological function(s) and clinical significance of the following lipids: cholesterol, triglycerides, HDL, and LDL.
8. in general terms, discuss the pathogenesis of atherosclerosis and coronary heart disease.
9. state the National Cholesterol Education Program Guidelines for cholesterol, HLD, LDL, and triglycerides.
10. correlate patient results/risk factors of an individual and determine whether a patient is likely to be at increased or decreased risk for coronary heart disease.

11. describe the routine methods for measuring total cholesterol, triglycerides, HDL, and LDL and **identify** any preanalytical issues that may affect the results of these assays.
12. given the necessary data, use the Friedewald formula to calculate LDL cholesterol.
13. list the major physiological functions of proteins.
14. describe the major function(s) and associated clinical abnormalities of the following proteins: albumin, haptoglobin, ceruloplasmin, transferrin, fibrinogen, C-reactive protein, complement proteins.
15. describe how the Biuret reaction and bromcresyl green tests are used to measure protein and albumin.
16. correlate clinical findings and laboratory assessment of proteins in regard to the following conditions: nephritic syndrome, acute and chronic infectious disease, autoimmune diseases, inflammatory diseases and immune deficiencies
17. discuss the metabolic defect, clinical features, and laboratory diagnosis of phenylketonuria.
18. describe the clinical utility for the measurement of the following enzymes: alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, amylase, creatine kinase, cTn1, lactate dehydrogenase, lipase, and serum cholinesterase.
19. list the specimen collections and handling precautions for ammonia determinations.
20. discuss the clinical significance associated with detecting abnormal levels of ammonia in the blood.
21. explain the chemical/physiological relationship that the following forms of bilirubin have to each other: conjugated/unconjugated and direct/indirect bilirubin.
22. describe the physiological consequences of an extremely elevated bilirubin level in infants.
23. list the clinical conditions in which indirect bilirubin may reach elevated levels.
24. list the clinical conditions in which direct bilirubin may reach elevated levels.
25. discuss specimen collection and handling for bilirubin determinations.
26. given the appropriated data, calculate the creatinine clearance.
27. given the appropriate data, calculate the BUN:creatinine ratio and discuss clinical correlations.
28. describe the usual causes of elevated uric acid.
29. apply prior knowledge to problem solving included recognition of abnormal or unusual test results, recognition of unacceptable quality control results and verification of test results.
30. explain the general concepts of laboratory instrumentation to include: spectrometry, luminescence, electrochemistry, electrophoresis, and chromatography.

LAB COMPETENCIES

Students will

1. perform patient testing on chemistry analyzer(s) including changing or replacing reagents/disposables as necessary, troubleshooting analyzer performance problems, and evaluating patient test results for critical values, and inappropriate specimens. Accuracy, precision, and timely reporting of test results must comply with the laboratory acceptable standards.
2. record daily/shift QC results. QC log must be recorded, dated and signed.
3. demonstrate safe and professional work habits. Student is expected to consistently follow laboratory safety procedures consistent with OSAH and laboratory policy.

MNTC GOALS/OBJECTIVES/OUTDOMES:

N/A

HCC COMPETENCIES MET:

Working Productively and Cooperatively
Thinking Creatively and Critically

STUDENT CONTRIBUTIONS:

Students are expected to attend all lectures and labs, complete assignments on time, and spend the necessary study time to pass all exams.

STUDENT ASSESSMENT SHALL TAKE PLACE USING INSTRUMENTS SELECTED/DEVELOPED BY THE COURSE INSTRUCTOR.

SPECIAL INFORMATION: (SPECIAL FEES, DIRECTIVES ON HAZARDOUS MATERIALS, ETC.)

Students are expected to purchase lab coats and a calculator. Powder-free gloves are supplied.

AASC APPROVAL DATE:	**March 25, 2015**
REVIEW DATE:	**March 2020**

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