RARITAN VALLEY COMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE

MLTC 220 Immunohematology

I. Basic Course Information

A. Course Number and Title: MLTC 220 Immunohematology

B. New or Modified Course: Modified

C. Date of Proposal: Semester: Fall Year: 2024

D. Effective Term: Fall 2025

E. Sponsoring Department: Science & Engineering

F. Semester Credit Hours: 4 credit

G. Weekly Contact Hours: 6 Lecture: 3
Laboratory: 3
Out of class student work per week: 7.5

H. Prerequisites: MLTC 100, MLTC 110, and MLTC 130 with a grade of C or higher; or permission of the instructor

I. Laboratory Fees: No

II. Catalog Description

Prerequisites: MLTC 100, MLTC 110, and MLTC 130 with a grade of C or higher; or permission of the instructor. This class covers the basic theory and concepts of antigen-antibody reactions as they relate to blood cell transfusions. The structure of blood group antigens and the genetics of their inheritance are closely examined. Antibody production and the role of antibodies in transfusion reactions are studied in depth. Methods are introduced for performing blood grouping and compatibility testing. Proper donor and component selection are also covered. Labs help students develop blood banking skills and provide hands on experience in blood bank procedures.

III. Statement of Course Need

A. Immunohematology skills are necessary for competent MLTs. This course is required for the Medical Laboratory Technology program.

B. There is a lab component in this course so that the theory can be practiced.

C. This course generally transfers as a Free Elective, but dependent on the transfer institution it may transfer as a Program Elective to schools that offer a B.S. degree in Clinical Laboratory Science.

IV. Place of Course in College Curriculum

A. Free Elective
B. This course meets a program requirement for the Associate of Applied Science degree program in Medical Laboratory Technology
C. To see course transferability: a) for New Jersey schools, go to the NJ Transfer website, www.njtransfer.org; b) for all other colleges and universities, go to the individual websites.

V. Outline of Course Content

I. BLOOD PRODUCTS
- A. Donors
  1. Qualification
  2. Collection methods
  3. Adverse reactions
  4. Special donations (e.g., autologous)
- B. Processing
  1. Testing
  2. Labeling
- C. Storage
  1. Anticoagulants/additives
  2. Temperature requirements
  3. Transportation
  4. Properties of stored products
  5. Expiration
- D. Blood Components
  1. Red blood cells
  2. Cryoprecipitated AHF
  3. Platelets
  4. Plasma
  5. Leukocyte-reduced components
  6. Frozen/deglycerolized red blood cells
  7. Apheresis products
  8. Fractionation products
  9. Whole blood

10. Washed red blood cells
11. Rejuvenated red blood cells
12. Irradiated components

E. Blood Component Quality Control

II. BLOOD GROUP SYSTEMS

A. Genetics

1. Basic
2. Molecular
3. Inheritance of blood groups

B. Chemistry, Antigens

1. ABO
2. Lewis
3. Rh
4. MNS
5. P1PK/Globoside(P)
6. Ii
7. Kell
8. Kidd
9. Duffy
10. Lutheran
11. Other
12. Antigens of high prevalence
13. Antigens of low prevalence
14. Platelet-specific
15. Granulocyte-specific

C. Role of Blood Groups in Transfusion

1. Immunogenicity
2. Antigen frequency

III. BLOOD GROUP IMMUNOLOGY

A. Immune Response

1. Primary and secondary response
2. B and T cells, macrophages
3. Genetics

B. Immunoglobulins

1. Classes and subclasses
2. Structure
3. Biologic and physical properties

C. Antigen-Antibody Interactions

1. Principles
2. Testing
    a. Principles
    b. Methods

D. Complement

1. Classical and alternative pathway mechanisms
2. Biologic properties

IV. PHYSIOLOGY AND PATHOPHYSIOLOGY

- A. Physiology of Blood
    - 1. Circulation and blood volume
    - 2. Composition and function of blood
        - a. Normal function
        - b. Abnormal physiology
    - 3. Cell survival
    - 4. Cell metabolism
- B. Hemostasis and Coagulation
    - 1. Coagulation factors and disorders
    - 2. Platelet functions and disorders
- C. Hemolytic Disease of the Fetus and Newborn
    - 1. Pathophysiology
    - 2. Detection
    - 3. Treatment
    - 4. Prevention
- D. Anemias
    - 1. Congenital and acquired
        - a. Pathophysiology
        - b. Detection
        - c. Treatment
    - 2. Immune hemolytic anemias: warm, cold, drug-induced
        - a. Pathophysiology
        - b. Detection
        - c. Treatment
- E. Transplantation
    - 1. Solid organ
    - 2. Hematopoietic progenitor cells (HPC)

V. SEROLOGIC AND MOLECULAR TESTING

- A. Routine Tests
    - 1. Blood grouping tests
    - 2. Compatibility tests
        - a. Antibody detection
        - b. Crossmatch
    - 3. Antibody identification/clinical significance
    - 4. Direct antiglobulin testing
- B. Reagents
    - 1. Antiglobulin sera
    - 2. Blood grouping sera
    - 3. Reagent red cells
- C. Application of Special Tests and Reagents
    - 1. Enzymes
    - 2. Enhancement media
    - 3. Lectins
    - 4. Adsorptions
    - 5. Elutions
    - 6. Titrations

7. Cell separations
8. ELISA
9. Molecular techniques
10. Use of thiol reagents
11. Immunofluorescence
12. Solid phase
13. Column agglutination test
14. Chloroquine diphosphate
15. EDTA glycine acid

D. Leukocyte/Platelet Testing
1. Cytotoxicity
2. Platelet testing
3. Granulocyte testing

E. Quality Assurance
1. Blood samples
2. Reagents
3. Test procedures

VI. TRANSFUSION PRACTICE
A. Indications for Transfusion
B. Component Therapy
C. Adverse Effects of Transfusion
1. Immunologic reactions
2. Nonimmunologic reactions
3. Transfusion-transmitted diseases

D. Apheresis and Extracorporeal Circulation
E. Blood Administration and Patient Blood Management

VI. A. Course Learning Outcomes:

At the completion of the course, students will be able to:

1. Explain the clinical significance of blood bank tests and results (GE-1*).
2. Use appropriate mathematical applications to interpret data (GE-2*).
3. Perform proper laboratory techniques required in immunohematology analysis and interpret results (GE 3*).

(*Embedded critical thinking)

4. Discuss inheritance patterns of common blood group antigens.
5. Describe pre- and post-examination procedures for blood banking.
6. Identify agencies that regulate blood banks.
7. Describe regulatory requirements for donor selection, donor testing, blood component transfusion testing, and reporting of adverse effects.
8. Determine the appropriate blood component therapy and accurately select the appropriate product for transfusion for a given clinical scenario.

9. Identify the probable causes of transfusion reactions.
10. Develop professionalism, communication skills, and interpersonal relationships by working cooperatively with instructors, preceptors and fellow students.

C. Assessment Instruments

1. Exams
2. Assignments
3. Quizzes
4. laboratory products
5. laboratory reports
6. research papers
7. demonstrations
8. essays
9. journals
10. portfolios

VII. Grade Determinants

A. Exams
B. Assignments
C. Quizzes
D. laboratory reports
E. research papers

The primary formats, modes, and methods for teaching and learning that may be used in the course:

A. lecture/discussion
B. small-group work
C. computer-assisted instruction
D. guest speakers
E. laboratory
F. student oral presentations
G. simulation/role playing
H. student collaboration
I. independent study

VIII. Texts and Materials

A. Textbooks

Sample of specific text which may be featured:

- Basic and Applied Concepts of Blood Banking and Transfusion Practice, by P. Howard, 4th edition, Elsevier.

(Please Note: The course outline is intended only as a guide to course content and resources. Do not purchase textbooks based on this outline. The RVCC Bookstore is the sole resource for the most up-to-date information about textbooks.)

IX. Resources

A. Laboratory
B. Computers with internet access.
C. RVCC library databases.

X. Honors Options

An Honors Option is not available for this course.