Honolulu Community College
General Education – DIVERSIFICATION DESIGNATION
Certification and Recertification
Application Form
Spring 2012

APPLICANT: JOHN SHEN

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COURSE ALPHA and NUMBER: MICRO 130

COURSE TITLE: GENERAL MICROBIOLOGY

ESTIMATED NUMBER OF SECTIONS:
Fall: 3
Spring: 2

APPLICATION IS FOR:
☐ New Course ☐ Modified Course ☑ Existing Course ☐ Re-designation

☑ Certification ☐ Re-Certification. Date of last certification:

DIVERSIFICATION AREA DESIGNATION SOUGHT:
☐ DA (Arts) ☐ DP (Physical Sciences)
☑ DB (Biological Sciences) ☐ DS (Social Sciences)
☐ DH (Humanities) ☐ DY (Laboratory)
☐ DL (Literature and Language)

What percentage of the CONTENT of this course focuses on this diversification area? 100%

What percentage of CLASS MEETINGS focuses on this diversification area? 100%
1. **Hallmarks and SLOs.** Please explain how course-specific SLOs align with the diversification area’s hallmarks.

   **DB.1 Uses the Terminology of the Biological Sciences**
   I am including the SLOs and the Syllabus with the Lecture Schedule for this course. A perusal of the both of these will show that the entire course is one of expecting students to understand the terminology of basic biology, cell biology, and molecular biology. SLOs #5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 21, 22, 26, 28, 31, 34, 38, 39, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50. Within each of the SLOs, there is also specialized terminology that the student is expected to understand as well.

   **DB.2 Involves Knowledge and Theories Relating to the Processes of the Biological Sciences**
   SLOs #10, 13, 17, 18, 27, 31, 34, 48. These deal specifically with theoretical mechanisms used to explain observed phenomena and experimental results.

   **DB.3 Demonstrates Inquiry that is Guided by Observation, Experimentation, and Reasoning**
   SLO #2. When discussing the development of the germ theory of disease, the discovery of the first vaccine against smallpox is discussed in the context of observation and reasoning and the use of a very risky experiment to verify the efficacy of the vaccine. Likewise, the development of Koch’s Postulates for the identification of a given microorganism causing a specific disease is an exercise in understanding experimental protocol and especially, the necessity of controls in experimental design.
   SLO #14. The Gram stain is one of those basic stains that is used for helping identify bacteria. The stain was originally developed circa 1903, but the underlying mechanism of how it works wasn’t really understood until the 1960s. Understanding why the Gram stain works is guided by the above criteria.
   SLO #16. In discussing the bacterial genetics process of transformation, the original experiments by Griffith are used to illustrate how transformation was first discovered.
   SLO #46. When discussing Type I hypersensitivities and anaphylactic responses, the student is exposed to the anecdotal information (basically, observation of specific phenomena) which has lead to the understanding that these responses evolved as a body defense mechanism against parasitic infections (those caused by protozoa and worms).

2. **Assessment strategies.** Explain assessment strategies you have used (or plan to use) to measure the degree to which students exit the course with the course-specific SLOs. If there are multiple sections of the course taught by different instructors, please discuss how assessment is (or will be) carried out across instructors.

   There are three midterm examinations given in the course and the questions cover at least 90% of the material covered in that bloc of instruction, so a student is required to have mastered all of the...
content in order to earn a good grade. The exams are multiple choice and matching in format. I am attaching a typical midterm exam for your perusal. The students are given 90 minutes to complete any given exam. The final grade is based upon a class curve of 300 possible points. I do not use a bell shaped curve so much as I look for natural breaks between one group of scores and the next group of scores and assign grades based upon the groupings. Thus far, for the past 35 years, I have been the sole instructor for MICRO 130 on this campus. So the course contents have always been consistent.

3. **Assessment of assessment.** How have you used (or plan to use) the assessment findings to modify or improve this course? If there are multiple sections of the course taught by different instructors, please discuss how review of assessment results is (or will be) carried out across instructors.

No one told me 35 years ago, 25 years ago, or even 15 years ago that I’d have to document and justify changes that I’ve made to my midterm exams. Over the years, I have continuously refined the multiple choice questions with a goal of increasing simplicity, both in the questions and in the choices available for any given question. And since I normally returned the graded exams to the students, I have always been faced with the perpetual challenge of altering almost all of the questions on a given exam so that no student would be able to use an old exam to attain a high score. The real challenge is to change each question while retaining the clarity and non-ambiguity of each question. There have been minimal modifications to the contents of this course over the years except to gradually delete those topics not essential for future allied health majors and the continuous updating of materials to convey recent discoveries and paradigm shifts with respect to the subjects covered in the lecture. Much of this new information is conveyed to the students via email. Again, I measure my success in this course by hearing from former A students who got into and graduated from a nursing program. This information is intermittent and non-documentated since I only heard from some of the students, those who choose to notify me. 30 years ago, the information would only arrive via a letter from a former student since computers and emailing weren’t available up until about 20 years ago, and the conditions were primitive when we first began with the Apple MacIntosh. As our institution has learned over the years, there is NO way to track former students who took courses at HCC, let alone graduates from specific programs, and we individual instructors cannot be held accountable for keeping track of our former students.
DIVERSIFICATION BOARD DECISION:

☑ Approved
Re-Certification Due: Fall 2017

☐ Not approved
If not approved, reasons for disapproval:

Diversification Board Chair Signature: [Signature]
Date: 10/22/17
Course Descriptions
MICR 130 - General Microbiology

An introductory course to the world of microorganisms, with emphasis on bacteria, but including algae, fungi, protozoa, and viruses; their structure, growth and development, reproduction, and classification; and, their effects on people and their environment. Also included are selected topics in medical microbiology, immunology, and applied microbiology including food, industrial, sanitation, and public health microbiology.

3 hrs. lect. per week

STUDENT LEARNING OUTCOMES

1. Upon successful completion of MICR 130, the student will be able to:

2. Describe the contributions of the doctors and scientists who contributed to the establishment of the field of Microbiology.

3. Identify some of the important scientific fields that require a knowledge of Microbiology.

4. Categorize the major types of microscopes and demonstrate the basic rule of microscope design: the importance of resolution or resolving power.

5. Define the following terms: atoms, ions, covalent bonds, hydrogen bonds, chemical formulas v. structural formulas, chemical names v. common names.

6. Demonstrate the polymeric nature of macromolecules and identify the basic subunits of those polymers.

7. Identify examples of representative carbohydrates, lipids, proteins, and nucleic acids. Also, define the three major differences between DNA and RNA and explain their involvement in protein synthesis.

8. Define the functions of ATP and reduced NAD as sources of cellular energy.

9. Demonstrate the function of enzymes within the cell.

10. Illustrate the process of the aerobic respiration of glucose to demonstrate how one molecule of glucose can yield 38 ATPs worth of energy.

11. Differentiate between fermentation v. anaerobic respiration v. aerobic respiration.

12. Describe all the differences between Procaryotic and Eucaryotic cells.
13. Discuss the evolution of the eucaryotic cell by the Endosymbiotic Theory and all of the evidence for the theory.

14. Explain the differences between Gram + and Gram - cells as well as the structure of peptidoglycan.

15. Define basic terms in classical genetics and demonstrate the end results of mitosis and meiosis.

16. Compare the mechanisms of transformation, transduction, and conjugation in bacterial genetics.

17. Compare the cloning of genes via recombinant DNA technology and PCR technology, as well as explain the production of human proteins by genetically engineered cells.

18. Detail the coarse control mechanisms of the induction/repression of enzyme synthesis and the fine control mechanism of negative feedback inhibition.

19. Identify all of the components necessary in the nutrition of microorganisms as well as the classification of the various nutritional categories of microorganisms.

20. Define the growth of micro-organisms and compare the various methods for measuring the growth of microorganisms. Demonstrate the resulting population growth curve.

21. Designate the major classes of algae and compare their characteristics. Compare the basic difference between Photosynthesis by the photosynthetic bacteria as opposed to that of the cyanobacteria and green plants.

22. Discuss some of the health problems that result from the growth of some algae, like the "red tide" and Pfiesteria blooms.

23. Organize the protozoa into their major categories and discuss their differences and evolutionary relationships.

24. Describe some of the well known protozoan diseases of the human body including African sleeping sickness and malaria.

25. Organize the Fungi into their major categories and discuss their differences.

26. Compare the differences between the superficial mycoses and the deep, systemic mycoses as well as list some examples of each type.
27. Describe the reason why protozoan and deep mycotic infections are so difficult to treat.

28. Identify the characteristics of the Rickettsias and Chlamydiases and discuss how they are similar and how they differ. In addition, describe some of the best known diseases caused by these bacteria.

29. Identify many of the common bacterial diseases that afflict humans and outline the causative agents, symptoms, treatments, prophylaxes, and epidemiology of each one.

30. Define what is a virus and the components which make up a viral particle.

31. Demonstrate why viruses are kingdom specific. Explain the lytic cycle of the virulent phages and the lysogenic cycle of the temperate phages.

32. Become familiar with some of the common viral diseases that afflict humans.

33. Identify some of the characteristics of cancer cells and how these abnormal cells differ from normal cells of the body.

34. Describe the proto-oncogene theory for the origins of the oncogenic viruses.

35. Identify some of the common carcinogenic agents found in the foods that we eat.

36. Discuss the nature of the normal flora of the human body and where these m/organisms originate.

37. Describe examples of why the normal flora is beneficial to the body.

38. Contrast the various mechanisms of invasiveness into the body through various portals of entry. Compare the differences between Exotoxins and Endotoxins produced by different bacteria.

39. Organize the 5 classes of leukocytes (wbc's) found in human blood and discuss the functions of each class. Also, define the lymphatic system of the body and discuss its importance in terms of function.

40. Designate the functions of the First, Second and Third Lines of defense of the human body.

41. List five examples of mechanical external barriers and five examples of chemical external barriers. Discuss the mechanism of the inflammatory response and compare the functions of this response with the generalized phagocytic response.
42. Define the organs of the RE System and discuss the function of the RE System in the defense of the body.

43. Compare the concept of the Non-specific immune responses of the body to the specific immune responses of the body.

44. Describe the B-system of immunity (humoral immunity) of the body in terms of the definition of an antibody (Ab) and how the Abs are classified according to their structural differences and their functional differences. Detail how Abs are produced by the body.

45. Describe the T-system of Immunity (cell mediated immunity or CMI) of the body. Detail how effector T-lymphocytes are produced by the body. Explain some of the major CMI activities of the body and how they protect you from different pathogens and cancers.

46. Define the nature of allergic responses of the body and compare the Type I hypersensitivities with the Type IV hypersensitivities. Also compare the differences between cutaneous localized anaphylactic responses as opposed to generalized systemic anaphylactic responses.

47. Describe some examples of Type IV hypersensitivity responses.

48. Describe the theory behind the development of "self-recognition" or "self-tolerance" of auto-antigens, and how a failure in the development can result in autoimmune (AI) disorders and diseases.

49. Compare the 4 different types of transplants or grafts into the human body and discuss the nature of rejection of transplanted tissues or organs. Discuss the graft v. host response.

50. Discuss the nature of blood group antigens (ABO System and Rh System) in terms of antigens and antibodies.
MICRO 130
SYLLABUS FOR THE TELECOUSE (DISTANCE ED)

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Goals for this course

This course is a non-majors microbiology course (students not pursuing a degree in the biological sciences or pre-med or pre-vet) which fulfills core requirements in the Natural Sciences and also is a required course for most allied health programs like Nursing, Dietetics, Nutrition, Dental Hygiene, etc. This course meets the Diversification Hallmarks for Biological Sciences (DB).

The specific goals for this course are listed in the the SLOs on the following pages.

EXAMINATIONS

There will be 3 midterm examinations that will ultimately determine the student’s grade in the course. There is NO comprehensive final exam. The student will have to get in touch with the TESTING CENTER at the closest convenient community college campus to take each exam. The Testing Centers, people to contact, and phone numbers and email addresses will be attached on a separate page. Please be advised that there is a rapid turnover of personnel at some of these Centers so do not expect to reach the individual whose name is provided.

The student will have to provide a PICTURE ID in order to take the exam.

The exam format will be multiple choice and matching (no short answer, no fill-in the blanks, no essays, etc.) However, at the end of each midterm exam there will be several OPTIONAL essay questions or problems which a student may attempt for extra credit (usually 5 pts per question).

For all 3 midterm exams, the student will be permitted to use a one-page CRIB SHEET (cheat sheet), 8.5" X 11" both front and back on which the student may HAND WRITE whatever information they desire. The Crib Sheet may not be typed or word-processed. The Crib Sheet is completely optional for the student.

I will be sure that the proctor for the exams at the various campuses are aware of what the student may use for each midterm exam.
I will announce in the televised lecture when one block of instruction is concluded and when it is time to take the exam (one week period). I will also send out the Exam week dates at least two weeks before the exam week. If a student eventually fails to take the exam within the prescribed period, without contacting me and providing a legitimate excuse, I will consider that the student had missed that particular exam and will receive “0” points for a score.

GRADING

The grades will be determined as a class, based upon 300 total points possible. Generally speaking, the cut-off between As and Bs is usually around 265 points or so, and the cut-off between Bs and Cs is in the vicinity of 235 points. These are just tentative figures to give the student and idea of what they have to “shoot for” in order to earn a particular grade.

In the community college system in Hawaii, we have a grade known as an “N” grade which means no grade, which means you never took the course. I reserve the “N” grade for those students who complete the course (who’ve taken all 3 exams) but who do not have sufficient points for a passing grade. 150 points or 50% is the cut-off for a passing grade of “D”. Once again, I will give an “N” grade to any student who completes the course but does not attain a passing grade.

However, if a student DISAPPEARS from the course (meaning who does not complete all 3 midterms and who does not Withdraw from the course) and who does not notify me about his/her intention not to complete the course, that student will receive an “F” grade. That student will have “earned” an “F”.

LECTURE SCHEDULE

The Lecture Schedule is attached with a listing of Lecture Number and Topics covered in that specific lecture.
LECTURE SCHEDULE

Each lecture "topic" will only refer to the principle topic(s) covered in that lecture because no topic will necessarily begin and end within any single 52 minute lecture. So the start of each lecture will pick up wherever the end of the previous left off.

<table>
<thead>
<tr>
<th>LECTURE #</th>
<th>TOPIC(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to the course: How to study for any college level science course and telecourses, in general. The scope of the field of Microbiology. Begin the history of Microbiology (4 separate historical trends)</td>
</tr>
<tr>
<td>2</td>
<td>Continue on the history of Microbiology ending with the Cell Theory of Life.</td>
</tr>
<tr>
<td>3</td>
<td>Conclude the history of Microbiology with monoclonal antibodies (MAbs). Microscopy--the basic theory of microscope design and different types of microscopes available for the study of micro-organisms.</td>
</tr>
<tr>
<td>4</td>
<td>Basic chemical terminology. I do NOT teach any real chemistry in this course; only terms and concepts. Atoms, Ions, and bonding (ionic, covalent, and hydrogen). Begin Macromolecules with Carbohydrates</td>
</tr>
<tr>
<td>5</td>
<td>Continue on Macromolecules by concluding Carbohydrates and beginning Lipids (fats &amp; oils)</td>
</tr>
<tr>
<td>6</td>
<td>Continue on Macromolecules by finishing up Lipids, start and finish the nucleic acids (3 major differences between DNA &amp; RNA) and how they function within the cell. Begin the subject of Proteins and protein structure.</td>
</tr>
<tr>
<td>7</td>
<td>Complete the proteins and cover Protein Synthesis (also known as Gene Function) by discussing the processes of Transcription and Translation. THIS IS THE MOST IMPORTANT PRINCIPLE THAT YOU MUST LEARN IN THIS COURSE. Discuss the role of ENZYMES in all living cells. Begin discussion of High Energy Intermediate molecules: ATP and reduced NAD (NADH2).</td>
</tr>
<tr>
<td>8</td>
<td>Continue on Cell energetics by talking about the &quot;big picture&quot; of aerobic respiration of glucose and begin with Glycolysis (the first step of glucose breakdown) and the role of glycolysis in different types of fermentations.</td>
</tr>
<tr>
<td>9</td>
<td>Finish up Cell Energetics by discussing the transition reaction, the Krebs' Cycle, and the Electron Transport System (ETS). Also discuss the relative efficiencies of aerobic respiration v. anaerobic respiration v. fermentation. Begin Cytology, the study of cells. Begin to compare differences and similarities between Prokaryotic and Eukaryotic Cells. Cyttoplasmic membrane functions: selective permeability, passive diffusion, facilitated diffusion, and active transport.</td>
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</table>
Continue cytology by discussing Osmosis, then the Eucaryotic nucleus (structure & function) and Protein synthesis in eucaryotic cells and the nature of the Eucaryotic genes with introns and exons and the editing of m-RNA. Discuss other organelles including mitochondria, plastids, and endoplasmic reticulum (ER).

Conclude cytology with story about 70s v. 80 ribosomes and how the serendipitous discovery of 70s ribosomes in Eucaryotes resulted in the Theory for the Evolution of the Eucaryotic cell via Endosymbiosis. Also discuss the "Big Picture" of the history of life on our Planet beginning 3.7 billion year ago.

The Bacteria: Structure and Function. Emphasis on the Peptidoglycan cell wall and the role of B-lactam ATBs (like penicillins and cephalosporins) as well as broad spectrum ATBs like tetracyclines & erythromycin. Discuss the Gram Stain procedure and how it distinguishes between two different types of bacterial cell walls: Gram + and Gram -. Begin cell morphology.

Finish up on the Bacteria by completing morphology, discussing other bacterial cellular components ending with energy storage inclusions and endospores. Begin nutrition (microbial physiology) with carbon and energy sources.

EXAMINATION I which will cover up to and including The Bacteria. Remember, you will be permitted a one-page, HANDWRITTEN, Crib-sheet, 8 1/2" X 11" front and back.


Microbial Physiology: Growth of Micro-organisms and how we measure growth (6 different methods). The population Growth Curve and applications of the growth curve.

Physiology: The effects of the environment on the growth and survival of micro-organisms: temperature, oxygen, hydrostatic pressure, acids & bases, salinity (osmotic pressure), and radiation. Bacteria that survive in extreme environments or the extremophiles. Introduction to the Archeae, a group of ancient surviving procaryotes from an early period in Earth's history when environmental conditions were much more severe. Begin Microbial Genetics by discussing what is a Gene.

Microbial Genetics continued. Traditional Mendelian Genetics which applies to Eucaryotes only, not procaryotes. Mitosis & Melosis applies to Eucaryotes only. Asexual v. Sexual reproduction and the importance of SEX.
Mechanisms of genetic transfer in the bacteria designed to increase genetic variation within the population. Transformation, transduction (phage mediated) and conjugation. Control mechanisms in the bacteria. Coarse controls involving operons and the induction & repression of enzyme synthesis.

Fine control mechanisms involving the negative feedback inhibition of pre-existing enzymes. Both types of controls are designed to assist the cell in saving energy and to avoid synthesizing unnecessary enzymes and unnecessary metabolic end-products. Genetic engineering and the cloning of genes by recombinant DNA technology (and the production of human proteins) and PCR technology (primarily for identification purposes). Start the algae: different types of photosynthesis.

The classification of the algae into 6 major groups based upon colors (types of chlorophylls, accessory pigments, cell wall materials, and storage materials). The characteristics and the classification of the Protozoa based upon their mechanisms of motility or movement. Start Medical Protozoology with African trypanosomiasis.

Complete Medical Protozoology with the story of DDT as a banned insecticide, other forms of trypanosomiasis, leishmaniasis, water-borne protozoan diseases, toxoplasmosis and malaria. Begin the general characteristics of the Fungi.

Conclude the characteristics of the Fungi and discuss their classification. Discuss the atypical fungi like the true and the cellular slime molds, and the yeasts. Cover the large groups of traditional fungi and the trash can category of the deuteromycota or Fungi Imperfecti. Begin Medical Mycology, or diseases caused by the fungi. Differentiate between superficial mycotic fungi caused by hyphal fungi v. deep systemic mycoses caused by dimorphic fungi which are opportunistic parasites.

EXAMINATION II. You will be permitted to use a one-page handwritten crib sheet, 8 1/2" x 11" on both sides PLUS your Chart of Medical Bacteriology diseases from the first list in your behavioral objectives package. You should take the exam within a week after this notice at the most convenient test center that is accessible to you.

Conclude Fungal Diseases and begin the Rickettsias and the Chlamydias, the obligate intracellular procaryotes that represent the smallest living cells in nature.

Characteristics of the Rickettsias and Chlamydias and how they differ from one another. Diseases caused by the Rickettsias and the Chlamydias. General characteristics of the Viruses. The lytic cycle of the virulent phages and the lysogenic cycle of the
temperate phages and the concept of lysogenic conversion. Start viral diseases

Continue on viral diseases and finish up. Discuss the nature of TSEs (transmissible spongiform encephalopathies) caused by infectious prion-proteins, and distinguish between animal TSEs v. human TSEs.

Discuss some of the properties of the transformed tumor cell (cancer) and the nature of oncogenic viruses. Start Host-Parasite relationships by discussing infection and disease, as well as pathogenicity v. virulence.

Discuss the two major factors that determine the virulence of a pathogen: Mechanisms of invasiveness (designed to bypass normal host defense mechanisms) and the Toxicity once the pathogen gets into the body. The differences between exotoxins and endotoxins.

The Lymphatic System of the Body.
Blood and the 5 classes of white blood cells (leukocytes) in the body. The Body’s First Line of Defense

The Body’s Second Line of Defense, the Non-Specific Immune Responses including the Inflammatory Response which protects body surfaces and the Generalized Phagocytic Response including the RES which protects the blood and internal organs. Introduce the Third Line of Defense by discussing the B-system involving Antibodies and how they are divided into 5 structural classes and 5 functional classes.

How the Body’s Third Line of Defense becomes activated, both the B-System (antibody formation) and the T-system (Cell Mediated Immunity or CMI). How the T-system works in defending your body: roles of effector T-lymphocytes and Cytokines.

Dysfunctions of the Immune Response. Type I and Type IV hypersensitivities mediated by the B & T-systems, respectively. Rheumatic Fever, Rheumatoid Arthritis, Transplantation Immunity & 4 classes of Grafts or transplants. Autoimmune diseases of the human body. ABO blood group antigens. The Rh factor and birth problems.

EXAMINATION III. On this Exam, you may use a one page crib sheet which may be typed and/or word-processed. In addition you may use your Chart of the second list of bacterial diseases. And you may also use pages 66-60 on viral diseases.
1. What types of foods are usually implicated in a case of Listerosis, caused by Listeria?
   a. raw ahi or aku  
   b. bad coffee      
   c. raw eggs       
   d. deli meats & dairy products  
   e. lettuce & cucumbers

2. What organ of the body does glomerulonephritis affect?
   a. brain  b. liver  c. pancreas  d. kidney  e. tonsils

3. What is the third stage of symptoms associated with a case of syphilis?
   a. A type IV HS reaction involving massive tissue destruction throughout the body including blindness, insanity, gummas, etc.
   b. A chancre at the initial site of infection
   c. A rash over most of the body and fever, both of which eventually subside
   d. Both male and female sterility
   e. Obviously, it's none of the above

4. What ATB is used to treat a case of syphilis?
   a. tetracyclines  
   b. cipro         
   c. fluoroquinolines
   d. rifamycin     
   e. none of these

5. Which of the following symptoms is MOST COMMON of gonorrhea?
   a. gonorrheal arthritis  
   b. urethritis
   c. gonorrheal endocarditis
   d. gonorrheal meningitis
   e. none of these

6. Which atypical form of pneumonia is caused by a bacterium W/O a cell wall?
   a. Pneumococcal pneumonia  
   b. Streptococcal pneumonia
   c. Mycoplasmal pneumonia
   d. Klebsiella pneumonia
   e. none of these

7. The causative agent of Scarlet Fever is
   a. Staph. Aureus  
   b. a red bacterium
   c. Strep. Scarlatti
   d. a lysogenized Strep. Pyogenes
   e. Campylobacter
8. Which one of the following is NOT true of Diphtheria?
   a. the causative agent is Corynebacterium diphtheriae
   b. the cause of death is heart failure
   c. the DPT vaccine has made this a remarkably rare childhood disease
   d. only lysogenically converted cells produce a powerful exotoxin
   e. Somehow, I think that all of the above are true

9. Which one of the following statements is TRUE of pertussis?
   a. the causative agent is Bordetella whoopyitis
   b. it is transmitted by whooping cranes and whoopy cushions
   c. there is a now a vaccine for older teens and adults (above and beyond the DPT vaccine for children)
   d. only lysogenically converted cells produce the toxin associated with the disease symptoms
   e. I'm pretty sure that none of these are true

The next set of diseases applies to questions 10-15. Use each letter ONCE unless you are guessing.

   a. salmonellosis      c. botulism      e. E. coli gastroenteritis
   b. shigellosis        d. cholera       f. Staph food intoxication

10. ____ this is associated nowadays with improperly home-canned (jarred) foods

11. ____ a very common cause of “traveler’s” diarrhea when drinking water is fecally polluted

12. ____ usually undercooked poultry and raw eggs are associated with this

13. ____ bacterial dysentery where there is lots of blood loss in the stool (feces)

14. ____ this disease used to kill its victims by severe dehydration and the body going into shock. Today it is easily treatable with a form of “Gatorade”

15. ____ a very common food poisoning after eating mayonnaise based salads left outside on a warm day all afternoon or evening long.

16. How is typhoid fever transmitted??
   a. by aerosol dispersion when someone with it coughs or sneezes
   b. by infected toilet seats
   c. by a vector, specifically the human louse
   d. by migratory birds that defecate while flying overhead
   e. Somehow, I don’t think that it’s any of these
17. Which one of the following statements is NOT true of Tuberculosis??

a. the causative agent is Mycobacterium tuberculosis (osis)
b. once in the lungs, the m/o is walled off in “tubercles” that show up in X-rays
c. from the lungs, the bacteria can spread to other major organs of the body
d. the “old” name for TB was “consumption”
e. today, drug and ATB-resistant strains are spreading through the global population.

18. Legionellosis can be transmitted by all of the following methods EXCEPT

a. by a vector, the Legionnaire’s deer tick
b. by contaminated water in cooling towers for large A/C units
c. contaminated water in artificial waterfalls (like at malls and water parks)
d. in water lines in hospitals and A/C cooling towers

e. obviously, all of the above are modes of transmission

19. Animals viruses and Bacteriophages DIFFER in all of the following ways EXCEPT

a. method of entry c. having an envelope e. a nucleic acid core
b. method of exit d. being species specific

20. All of the following are “parts” of a standard bacteriophage EXCEPT

a. tail pins c. a sheath e. a baseplate
b. tail fibers d. a helical capsid

21. In the infection phase (of a phage), all of the following events occur EXCEPT

a. the phage has to “dock” with a specific molecular binding site on the cell wall
b. the phage can actively “swim” towards the binding site by using its tail fibers
c. once attached to the cell, the phage injects its nucleic acid into the host cell
d. the sheath acts like a spring and suddenly contracts
e. obviously, all the of these events occur

22. Which one of the following is NOT true of Lysogeny in some bacteriophages?

a. always caused by temperate phages
b. the phage genome is incorporated into the host cell genome
c. lysogenic conversion is responsible for toxin production by a number of different pathogenic bacteria
d. lysogenized cells exposed to UV radiation will go into a lytic cycle
e. there is no such thing as “lysogeny” between animal viruses and their host cells
23. Up until 25 years ago, there was NO "cure" for any viral diseases (only prophylaxis). Why not?

a. there was no need for a "cure"
b. there was no way to block the translation of only viral proteins
c. there was no way to block normal eukaryotic cellular transcription
d. because anti-viral drugs only destroyed virus-infected cells
e. I don't have a clue

24. Today there is an increasing array to anti-viral drugs available to combat different viral diseases. In general, how do almost all of these drugs work? They target

a. specific enzymes inside the eukaryotic (human or animal) cell
b. specific enzymes that are carried only by the viruses
c. the envelopes of viruses and destroy them
d. the binding sites on the surfaces of host cells and prevent the virus from entering
e. you’ve got to be kidding---I never studied this!!!

The next set of viral diseases applies to questions 25-32

a. yellow fever  h. measles  o. infectious hepatitis (HAV)
b. rubella  i. ebola fever  p. serum hepatitis (HBV)
c. influenza  j. common cold  q. non-A, non-B hepatitis (HCV)
d. chicken pox  k. cytomegalov  r. herpes simplex I
e. HIV  l. smallpox  s. herpes simplex II
f. Dengue fever  m. Lassa fever  t. viral pneumonia
g. Adenovirus  n. mumps  u. mononucleosis

25. ____ a disease common among heroin addicts who share a needle

26. ____ this mosquito-borne disease is known as "breakbone" fever

27. ____ the American form of Ebola hemorrhagic fever—mosquito vector

28. ____ prophylaxis for this disease consists of a vaccine BEFORE pregnancy

29. ____ a “childhood” viral disease that can cause male sterility when an adult male comes down with the disease.

30. ____ an endemic African disease transmitted by contacting rodent urine /blood

31. ____ this disease is caused by the same latent herpesV that causes shingles

32. ____ a poorly understood endemic virus that can cause fetal birth defects
33. Which statement is TRUE of IF (Interferon)??

a. we are treated with IF harvested from rabbits and sheep  
b. drug companies manufacture the IF polypeptides with chemical reactions  
c. a single virus infected cell produces huge amounts of IF  
d. IF today is produced by transgenic E. coli  
e. I didn’t study this stuff, either, so I don’t have a clue

34. Which HUMAN TSE is transmitted via the consumption of diseased cattle “parts”, probably brain tissue mixed in with sausages and ground beef burgers??

a. scrapie  
b. CJD  
c. kuru  
d. CJD-new variant  
e. Alzheimer’s

35. There are now a number of human oncogenic viruses that have been identified.  
But 30 years ago, early evidence indicated that there were epidemiological “hot Spots” for a human juvenile form of cancer that might have a transmissible Agent related to

a. Shope papillomaV  
b. feline/murine LeukoV  
c. EBV (Epstein-Barr)  
d. polyomaV  
e. SV40

36. Where do Oncogenic viruses actually “get” their specific oncogenes from??

a. they evolved that way---strictly random genetic variations, some of which just happen to be oncogenic for animals or for humans  
b. they acquired them from cancerous cells which already had an active oncogene---a form of specialized transduction  
c. Oncogenes just spontaneously appeared within certain viruses  
d. Oncogenes were created by virologists working in labs developing weapons grade viruses for biological warfare.  
e. somehow I don’t think that it’s any of the above

37. When a normal cell is transformed into an abnormal cell, which one of the following is TRUE??

a. transformed cells have a greatly accelerated aerobic respiration  
b. there is an INCREASE in contact inhibition, resulting in unrestricted growth  
c. there is a INCREASE in specific cell affinities resulting in metastasis  
d. there is NO change in cell surface antigens  
e. most transformed tumor cells tend to grow faster than do normal cells

38. Every cell of your body contains over a dozen Proto-oncogenes. What is a proto-oncogene?
a. a gene that automatically transforms a normal cell into an abnormal tumor cell
b. an inactive gene that has to be activated by some form of mutagenic agent
c. a normal functioning gene involved in cell growth, and after a point mutation, can become an active cell transforming oncogene
d. actually, proto-oncogenes do not exist---they are just a theoretical construct.
e. did we actually cover this material??

39. Which one of the following bacteria would we NOT find in the normal flora of the human buccal cavity??

a. marine bacteria c. lactic acid bacteria e. enteric bacteria
b. anaerobic bacteria d. other soil bacteria

40. Which statement is NOT true of the normal flora of the body?

a. the normal flora provides microbial antagonism against pathogens
b. almost all of the normal flora derives from the soil, and may be windborne
c. displaced normal flora can often be pathogenic or virulent
d. so having a healthy normal flora is totally irrelevant to human health
e. somehow, I think that all of the above are true

41. All of the following are mechanisms of invasiveness into the body EXCEPT

a. intracellular parasitism of erythrocytes or rbcs which are so critical to a healthy immune response
b. the production of enzymes that kill different phagocytic leukocytes
c. organotropic adaptation to specific organs and tissues of the body
d. the possession of anti-phagocytic capsules
e. production of extracellular enzymes that destroy tissue-cementing materials, and even, blood clots

42. Which one of the following is FALSE about EXOTOXINS?

a. they are usually proteins which are heat labile
b. they are released upon the death & lysis of Gram – bacterial cells
c. they are among the deadliest toxins known to man
d. toxoids can be produced from them
e. there are anti-toxins available which can be administered to inactivate them

43. Which one of the following would probably be an Endotoxic symptom??

a. paralysis c. fever and shock e. nausea
b. insanity d. itchy eyes and runny nose
44. Which class of phagocytic leukocytes are bound to tissues of the RES?
   a. PMNs  b. monocytes  c. basophils  d. eosinophils  e. histiocytes

45. The most plentiful phagocytes in your bloodstream are the
   a. B & T lymphocytes  c. PMNs  e. none of these
   b. eosinophils & basophils  d. granulocytes and agranulocytes

46. Which one of the following does NOT occur during an Inflammatory Response?
   a. symptoms include wheal and erythema
   b. there is a vaso-dilation of capillaries resulting in increased blood flow
   c. there is an increase in vascular permeability to promote diapedesis
   d. the monocytes are the first phagocytes to appear at the site, followed by the neutrophils which scavenge the trauma site.
   e. traumatized mast cells release histamines, kinins, and serotonin

47. When you urinate, which Physical External barrier is utilized??
   a. cough & sneeze reflexes  c. lavaging action  e. urine kills bacteria
   b. ciliary escalation  d. mucous coated hairs lining the urethra

48. All of the following are parasitic adaptations to avoid host defense mechanisms EXCEPT
   a. bacterial capsules  c. intracellular parasitism  e. extracellular enzymes
   b. leukocidin production  d. reverse phagocytosis

49. Which one of the functional classes of Abs will coat the surface of encapsulated bacteria??
   a. anti-toxins  c. agglutinins  e. opsonins
   b. precipitins  d. complement

50. Which one of the following is found in most vaccines, to INCREASE Ab production? A specific
    a. adjutant  b. adjacent  c. adjuvant  d. hapten  e. antigen

51. How many DIFFERENT polypeptide chains (primary structures) are there in an Ab (Ig) molecule??
    a. 5  b. 4  c. 3  d. 2  e. 1
52. In the graph to the right, which letter represents the "booster shot"?

53. Which structural class of Abs is found in your exocrine secretions??
   a. IgG       b. IgM       c. IgA       d. IgE       e. IgD

54. Which structural class of Abs triggers the development of rheumatoid arthritis?
   a. IgG       b. IgM       c. IgA       d. IgE       e. IgD

55. Which one of the following statements does NOT apply to the CLONAL SELECTION Model for Ab production??
   a. your body contains a vast pool of different B-lymphocytes
   b. when a specific Ag binds to its specific B-lymphocyte, there is negative selection and it dies off.
   c. When differentiation occurs one cell is the Ab-secreting plasma cell
   d. The other differentiated cell is the Ag-sensitive B-memory cell
   e. This model applies to both the B & T Systems of Immunity

56. Which one of the following is NOT an effector T-cell that can destroy intracellularly parasitized cells of the body??
   a. killer T-cells       c. T-suppressor cells       e. all of these are
   b. natural killer T-cells d. Cytotoxic T-cells       effector T-cells

57. What is the role of macrophages in both Ab production and CMI??
   a. they produce cytokines that stimulate Ab production
   b. they ultimately differentiate into plasma cells
   c. they present the Ag to specific helper T-cell (T4)
   d. they ultimately secrete specific Abs
   e. somehow, I don’t think that it’s any of the above

58. Which one of the following does NOT play a role in Ab-production??
   a. PMNs       c. macrophages       c. they all play a role
   b. B-cells    d. T4 helper cells
59. Which one of the following cytokines ATTRACTS wandering monocytes (macrophages) to the site of diseased cells or tissues?
   a. TNF (now AAF)   b. IL-2   c. MCF   d. MAF   e. MIF

60. For which one of the following is the T-system of immunity NOT involved?
   a. the destruction of intracellularly parasized cells of the body
   b. the phenomenon of graft rejection
   c. the destruction of virus infected cells of the body
   d. the production of precipitins and agglutinins
   e. the destruction of newly arising tumor cells with their TSAs

61. Which one of the following is NOT true of a Type I Hypersensitivity?
   a. the symptoms appear within minutes after exposure to the allergen
   b. the symptoms usually subside within an hour or so
   c. it can cause both localized and generalized anaphylactic responses
   d. it can affect any vascular tissues of the body (through which blood flows)
   e. it can cause classic "hayfever" symptoms

62. Which one of the following is NOT true of a type IV Hypersensitivity?
   a. it is responsible for generalized anaphylactic responses including SHOCK
   b. Symptoms usually take several days to show up
   c. Symptoms can last for weeks and months
   d. a reaction to the catechols of poison ivy is typical
   e. a reaction to nickel, polyester fibers, ingredients in detergents & cosmetics can also occur

63. Which one of the following allergens is NOT a problem out here in Hawaii?
   a. feline dander   c. canine dander   e. fungal spores
   b. ragweed pollen   d. mango & rose pollens

64. You would expect REJECTION of transplanted to tissue to take place in one of the following sites—-which one?
   a. kidneys   b. eyeball   c. testes   d. spinal cord   e. all of these

65. A transplant between a Great Dane and a Chihuahua would be classified as a(n)
   a. autograft   b. xenograft   c. allograft   d. isograft   e. impossible
66. Which one of the following is an auto-immune disease of the the mucosal lining of the stomach?
   a. systemic lupus erythematosus (SLE) or Lupus
   b. type I diabetes
   c. myasthenia gravis
   d. multiple sclerosis
   e. pernicious anemia

67. Why has cyclosporine greatly increased the success rate in human homografting?
   a. it hasn't
   b. it suppresses only the T-system of immunity
   c. it suppresses only the B-system of immunity
   d. it suppresses both the B & T systems of immunity
   e. it prevents the grafted tissues from rejecting the recipient's body

68. Where do B-lymphocytes mature in the human body?
   In the
   a. Bone marrow
   b. Bursa of the Fabricius
   c. GALT region
   d. Thymus gland
   e. none of these

69. Which blood type is the Universal Recipient?
   a. A
   b. B
   c. AB
   d. O
   e. none of these

70. Which one of the following characteristics do the Chlamydia NOT share with the Rickettsias?
   a. intracellular parasites
   b. permeable membranes
   c. degenerate bacteria
   d. cultured in vivo
   e. arthropod vectors

71. In the disease typhus, which tissue of the body becomes infected?
   a. the brain
   b. the liver
   c. the endothelial linings
   d. the heart
   e. the kidneys

72. What is the most widespread Chlamydial disease throughout the entire Third World (under-developed countries)?
   a. psittacosis
   b. typhoid fever
   c. chlamydial STD
   d. tsutsugamushi
   e. trachoma
73. The Chlamydiases are definitely NOT viruses for all of the following reasons EXCEPT???

a. they do not have any anabolic and catabolic pathways
b. they reproduce by binary fission
c. they have some peptidoglycan in their cell walls (B-lactam sensitivity)
d. they are sensitive to tetracyclines and chloramphenicol
e. they contain both DNA and RNA

BONUS OPTIONAL ESSAY QUESTIONS

1. Discuss the onset of Rheumatoid Arthritis

2. Discuss on Monoclonal Abs (MABs) are produced. Do NOT discuss any other aspect of MABs.

3. Discuss how Td lymphocytes are involved in the destruction of newly arising tumor cells.