**Exam 4 Study Guide**

Please note, this is a highlight of the most important aspects of this unit and reminders of commonly missed concepts. Please do not study only the material on this sheet. The PowerPoints, audio clips, discussion forums and videos are the online lecture components and have the material required for this exam. After learning this unit, you should be able to:

**Chapter 12 – Biotechnology and DNA Technology**

* Define: biotechnology, recombinant DNA, vector and clone
* Describe a typical genetic modification procedure
* Define: Selection, mutation, site-directed mutagenesis
* Discuss restriction enzymes
* Discuss vectors and their use in rDNA
* Discuss PCR and understand why there are different temperatures at each step
* List two ways of inserting DNA into a cell
* Discuss cDNA
* Discuss colony hybridization
* Discuss DNA probes and their use
* Briefly describe agarose gel electrophoresis and microarray analysis
* Understand why certain organisms are used to make products
* List some therapeutic applications of Biotechnology
* Describe gene silencing as it relates to the possible treatment of diseases
* Understand how DNA fingerprinting is used to track the cause of an outbreak
* Discuss forensic microbiology and how it differs from medical microbiology
* Define nanotechnology
* Discuss safety and ethics in regards to rDNA

**Chapter 4 – Prokaryotes**

* Understand there are five classes of proteobacteria and that they are all gram-negative. You do NOT need to classify gram-negative organisms into their proteobacteria class
* Define prosthecae
* Know which organism is the most abundant organism by weight in oceans
* Name the organism responsible for cat-scratch fever and briefly discuss this disease
* Name the disease(s) associated with the following organism(s) and any related details provided in the lecture:
  + *Rickettsia typhi*
  + *Rickettsia rickettsii*
* Associate *Wolbachia* with parthenogenesis and briefly define the process
* Know the name of the organism causing crown gall and the two organisms discussed in lecture that fix nitrogen
* Know that the genus *Acetobacter* can produce acetic acid from ethanol
* Be very knowledgeable regarding the information provided on *Neisseria*
* Know that *Zoogloea* are associated with sewage treatment
* Name the disease(s) associated with the following organism(s) and any related details provided in the lecture:
  + *Bordetella pertussis*
  + *Francisella tularemia* (hint: think hamsters)
  + *Moraxella lacunata*
  + *Acinetobacter baumanii*
  + *Legionella*
  + *Coxiella burnetii*
* Know the details of *Pseudomonas* well
* Know about the organisms causing and information regarding cholera
* Name the disease(s) associated with the following organism(s) and any related details provided in the lecture:
  + *Escherichia coli*
  + *Salmonella enterica*
  + *Salmonella typhi*
  + *Shigella*
  + *Klebsiella*
  + *Serratia marcescans*
  + *Proteus*
  + *Yersinia pestis*
  + *Enterobacter aerogenes*
  + *Pasteurella multocida* (hint: think komodo dragons)
  + *Campylobacter*
  + *Helicobacter pylori*
  + *Clostridium tetani*
  + *Clostridium botulinum*
  + *Bacillus anthracis*
  + *Staphylococcus aureus*
  + *Streptococcus pyrogenes*
  + *Streptococcus pneumoniae*
  + *Listeria monocytogenes*
* Discuss why blue-green algae underwent a name change
* Know that *Mycoplasmatales* are pleomorphic
* Know about the filaments of *Actinomycetes* and *Streptomyces*
* Name the disease(s) associated with the following organism(s) and any related details provided in the lecture:
  + *Mycobacterium tuberculosis*
  + *Mycobacterium leprae*
  + *Corynebacterium diphtheria*
  + *Propionibacterium acnes*
* Know that *Gemmata obscuriglobus* has a double internal membrane around its DNA
* Be familiar with the concepts regarding *Chlamydiae*
* Name the disease(s) associated with the following organism(s) and any related details provided in the lecture:
  + *Borrelia*
  + *Treponema pallidum*
  + Know these are both examples of spirochetes
* Know the information regarding the domain Archaea
* Discuss why we have yet to identify all bacterial species

**Chapter 4 part a – Classification**

* Define taxonomy and discuss why it is necessary in science
* Discuss why Latinized binomial nomenclature is used and why common names of organisms are avoided
* Know contributors to the system of classification: Aristotle, Linnaeus, Whittaker
* Know the 3 domains and 4 kingdoms of Eukarya
* Discuss how prokaryotes versus eukaryotes are classified
* Understand why viruses are not classified as a domain
* Briefly describe the differences between systematic and determinative Bacteriology
* Discuss phylogeny and descent with modification (hint: think Darwin)
* Review the theory of Endosymbiosis and proof thereof
* Define a Cladogram
* Define biochemical tests
* Lists some identification methods of organisms
* Describe a dichotomous key