

Study Guide to Midterm 2

Disclaimer: Not ALL of the questions on the midterm will necessarily be found on this document. The Study Questions you have been answering for each chapter are the basis for the midterm questions, but in order to phrase a logical multiple choice question, i.e. how the question is asked, it may be worded differently – the answer will remain the same.

This is intended to help focus your revision for the upcoming midterm- it is NOT a substitute for answering the chapter by chapter Study Questions.

Chapter 6 Microbial Growth

Name and describe the five different categories of temperature ranges for growth. For each state their T_{opt} .

Before the invention of refrigeration foods were commonly preserved by creating a hypertonic environment. Draw a hypertonic environment is relative to a bacteria cell, and explain why a hypertonic environment would inhibit bacterial growth. Provide three examples of different techniques that were used (and still are used today), to create hypertonic environments. Provide examples of foods preserved by each of the three techniques.

Diagram and thoroughly define the phases of a typical bacterial growth curve. What is happening during each phase? [Label the axes of your graph].

Explain the difference between the following; obligate aerobes, facultative anaerobes, obligate anaerobes, aerotolerant anaerobes, and microaerophiles. Diagram where each organism would grow in fluid thioglycollate medium.

Listeria is a common source of food poisoning in foods that were previously refrigerated. To which temperature preference category does Listeria belong? Why is Listeria of particular medical concern? What type of products are the highest risk of transmitting Listeria, and how are these foods treated to eliminate Listeria bacteria.

Name three toxic forms of oxygen. Describe the enzymes possessed by facultative anaerobes that allow them to detoxify forms of oxygen that are fatal to obligate anaerobes.

What is generation time? What is exponential growth? What may account for the switch from the log phase of growth to the stationary phase of growth of a microbial culture? During which phase of bacterial growth is penicillin most effective? An experiment began with 4 cells and ended with 128 cells. How many generations did the cells go through?

Most bacteria have a limited range of pH at which they can grow best. What is the optimum pH for growth of most bacteria? What name is given to an organism that can tolerate acidic conditions? What adaptations do these organisms need to possess in order to survive, and provide an example of such an organism.

Draw a table in which you describe the following types of growth medium: chemically defined, undefined, selective, differential, complex.

Chapter 7 Control of Microbial Growth

Draw and describe how the disk diffusion method would be used to evaluate the effectiveness of Chlorine, Hexachlorophene and O-phenylphenol against Pseudomonas aeruginosa.

Describe the following treatments; disinfection, sanitation, antiseptics, degerming, and sterilization.

Which types of microbes are the most susceptible to antimicrobial agents, and which types of microbes are the most resistant?

Diagram and describe how an autoclave sterilizes hospital equipment. Provide details on; pressure, temperature and time of a standard treatment used to sterilize glassware. What types of equipment can be sterilized by autoclaving, and what kinds of equipment cannot be autoclaved?

Chapter 8 Microbial Genetics

Use examples to demonstrate your understanding of the distinction between the following terms; genotype, phenotype, gene, chromosome, and genome.

Where does DNA replication start, in bacteria? Name and describe the role of two enzymes responsible for DNA replication. Part of a bacterial gene has a base sequence 5' ACAGGC. Diagram how this sequence would be copied during DNA replication.

If a DNA sample contains 13% adenine, what percentage of the sample contains cytosine?

Explain the difference between the sense and the anti-sense strands of DNA. Part of a bacterial gene has a base sequence 5' ACAGGC. Draw and label a diagram of how this sequence would be copied during transcription. Which enzyme is responsible for transcription? And name the three different molecules made by transcription.

Name one antibiotic that works by interfering with protein synthesis, and describe how does it works

What is the genetic code? The genetic code depicts groups of three letters, what do the letters represent, on which molecule do they occur, and what name is given to the groups of three letters?

Name and describe the functional roles of the three different types of RNA in gene expression. Explain the relationship between codons and an anticodons and the roles each play in translation.

Diagram the structure of the lac operon and label and define the function of 5 protein an/or DNA components involved in its function and regulation. Which type of operon is it?

Describe how Fredrick Griffith discovered the bacterial process of transformation. Based upon his observations identify which gene (or genes) had been transferred.

Draw and describe the bacterial process of transduction. Distinguish between generalized and specialized transduction.

Compare and contrast the 3 methods of horizontal gene transfer in bacteria.

Chapter 9 Recombinant DNA and Biotechnology

Starting with a human genome explain the process of creating recombinant DNA by inserting the human gene of interest into a bacterium such as Escherichia coli so that the bacterium would be able to synthesize the human protein.

What is recombinant DNA? Provide a description of the steps followed in the production of the Gardasil vaccine. Which disease does it prevent? Explain why subunit vaccines are considered as an advance from the cultures vaccines of the past?

What do the letters PCR stand for? Describe the process of PCR and describe one of the applications of PCR.

You have a small gene that you wish replicated by PCR. After 3 replication cycles, how many double-stranded DNA molecules do you have?

Describe the reaction catalyzed by DNA polymerase.

Describe the reaction catalyzed by reverse transcriptase.

Why are genes composed of cDNA preferred to genes composed of ordinary DNA when transferring a eukaryotic gene to a bacterium?

Chapter 12 Eukaryote Microbes

1. Complete the following grid on Eukaryote Microbes

Group	Kingdom	Nutrition	Cellularity	Features
	Protista	photoautotroph		
Protozoa		Chemoheterotrophs	Unicellular	
	Fungi		Unicellular and multicellular	Produce asexual and sexual spores
Helminths		Chemoheterotrophs		

How do yeasts differ from molds? Which organism is responsible for the opportunistic infection commonly known as thrush? What is a dimorphic fungus? Which environmental factor is responsible for the two different growth forms?

Phylum	Color	Cell Wall	Storage Material	Pigments
	Brown		Carbohydrate	Chlorophyll a and c xanthophylls
Rhodophyta		Cellulose		Chlorophyll a and d Phycobiliproteins
Chlorophyta		Cellulose	Glucose polymer	
Bacillariophyta	Brownish			Chlorophyll a and c, carotenes
		Cellulose in Membrane	Starch	Chlorophyll a and c, carotenes, xanthins

Which characteristics distinguish the group Apicomplexans? Describe the life cycle of the Plasmodium parasite inside a susceptible human host.

What is type of organisms are Giardia lamblia and Trichomonas vaginalis? Describe the transmission and symptoms of (a) Giardia and (b) Trichomonas. What conditions promote the colonization and growth of Trichomonas vaginalis? [also see page 760]How do Giardia and Trichomonas make ATP if they lack mitochondria?

Describe the differences in anatomy and taxonomy between cestodes, trematodes, and nematodes. Provide an example of a human pathogen from each of the three groups.

Describe a fungus from the following groups; Zygomycota, Ascomycota, and Basidiomycota. Name the type of sexual spores produced by each group.

Describe the nature of the association that we commonly call a lichen. Name and describe the three growth forms of lichens.

Algae are photoautotrophs, what does this mean in terms of their sources of carbon and energy? Describe the classification of the group of organisms known as Algae. Why are algae classified as protists rather than as plants?

*Name the organisms responsible for (a) Paralytic Shellfish Poisoning (**Red Tides**) and (b) Ciguatera. To which group of microbes do they belong? Describe how the two different diseases would be contracted.*

What do tapeworms eat? Describe a human infection by a pork tapeworm with humans as the definitive host. Describe a human infection by a pork tapeworm with humans as the intermediate host.