# Memmler’s The Human Body in Health and Disease (Fourteenth Edition)

# Lesson Plan

# Chapter 5—Disease and Disease-Producing Organisms

[Chapter 5 is addressed on pp. 49–65 of the IM]

# Key Terms

acute

antibiotic

antiseptic

arthropod

asepsis

bacteria

chronic

diagnosis

disease

disinfectant

endemic

endospore

epidemic

etiology

fungus

helminth

host

infection

microbiome

microorganism

nosocomial infection

opportunistic infection

pandemic

parasite

pathogen

# Key Terms

pathophysiology

prion

prognosis

protozoa

sign

sterilization

symptom

syndrome

systemic

therapy

toxin

vector

virulence

virus

# Goals of the Lesson:

*Cognitive*: The student will be able to identify the major sources of disease, particularly infectious disease, and the principle subspecialties of microbiology: bacteriology, protozoology, mycology, and virology. They will also be able to identify the principle parasitic worms and explain how they cause disease. Students will understand the principle methods for controlling the spread of microorganisms in human populations, and how microorganisms are cultured and identified in the laboratory.

*Motor*: Skills in using a microscope and identifying microorganisms (optional).

*Affective:* N/A

# Learning Objectives:

The lesson plan for each Learning Objective starts on the page shown below.

5-1 Define disease, and list seven categories of disease. 90

5-2 Explain the meaning of a *predisposing* cause of disease, and list seven such causes 91

5-3 Describe the science of epidemiology, and cite some types of studies done in that field 91

5-4 Define terms used in the diagnosis and treatment of disease. 92

5-5 Define *complementary* *and* *alternative medicine*; cite four alternative or complementary fields of practice. 93

5-6 Explain methods by which microorganisms can be transmitted from one host to another. 94

5-7 Name four types of microorganisms, and give the characteristics of each. 95

5-8 Define *microbiome*, and explain its value. 96

5-9 List some diseases caused by each type of microorganism. 96

5-10 Name two categories of parasitic worms, and give examples of each. 102

5-11 Explain the role of parasitic arthropods in causing disease. 103

5-12 Give four reasons for the emergence and spread of microorganisms today. 105

5-13 Describe four public health measures taken to prevent the spread of disease. 105

5-14 Differentiate between *sterilization* and *disinfection*, and give three examples of each 105

5-15 List the measures included as part of body substance precautions. 106

5-16 Name two types of antimicrobial agents, and give three examples of each. 107

5-17 Describe three methods used to identify microorganisms in the laboratory. 108

5-18 Using the case study, describe a virus’s mechanism of infection and the host’s response. 89, 109

5-19 Show how word parts are used to build words related to disease. 111

# You Will Need:

Gather the following materials and teaching aids\* for the following lessons:

5-6 Video: “Microbe Invasion: Learning from Good Guys and Bad Guys,” video player

5-7 Chart paper, pens or magic markers; Disease-Causing Bacteria Slide Set and Helpful Bacteria Microslides; microscope

5-8 Video: “Emerging Diseases: Prions and Viruses,” video player; marker and chart prepared for Objective 5-7

5-9 Nutrient agar plates, sterile cotton swabs, sterile water

5-10 Video: “Parasites: Eating Us Alive,” video player

5-11 Video: “Fighting the Microbes: A History of Antibiotics,” video player

5-12 Article: “From Flush to Farm,” 2002

5-13 Rubbing alcohol, bleach, sterile cotton swabs, nutrient agar plates

5-16 Ward’s Gram Staining and Bacterial Morphology Lab Activity

\*For complete information on these resources, refer to the individual Learning Objectives in the IM.

*Legend*: IM, Instructor’s Manual; IR, Instructor Resources at <http://thepoint.lww.com/MemmlerHBHD14e>; PPt, PowerPoint; SG, Study Guide; SR, Student Resources at <http://thepoint.lww.com/MemmlerHBHD14e>.**Learning Objective 5-1. Define disease, and list seven categories of disease.**

| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Disease—abnormality of structure or function of a body part, organ, or system
* Pathology—Study of disease
* Infectious diseases—infectious organisms possibly involved in at least half of all human illness
* Degenerative diseases—involve breaking down of tissue, e.g., MD, osteoporosis
* Some hereditary
* Some due to infection, injury, substance abuse, or normal “wear and tear”
* Some unknown cause, e.g., MS
* Nutritional disorders—can be:
* Dietary lack of essential vitamins, minerals, proteins, or other substances
* Excessive intake of substances (Chapters 19 and 20)
* Metabolic disorders—any disruption of reactions involved in cellular metabolism
* Hormones regulate some metabolic functions (Chapter 12)
* Heredity also can be a factor (Chapter 25)
* Immune disorders (Fig. 5-1) (Chapter 17)
* Deficiency of immune system from infection (e.g., HIV) or inherited
* Allergies
* Autoimmune diseases, e.g., MS
* Neoplasms—cancers and other types of tumors (Chapter 4)
* Psychiatric disorders—mental disorders, often impossible to separate from physical factors (Chapter 10)
 | 90 | 14–15 | FiguresFig. 5-1: Rheumatoid arthritis, p. 90; PPt 15 | In-Class ActivitiesReinforce that a disease may fall into multiple categories. IM p. 52Discuss the definition of disease and the implications of different definitions. IM p. 52 | Outside AssignmentHave students take the Chapter 5 Pre-Quiz (SR).Questions for Study and Review, pp. 111–113Read Introduction to Chapter 5, SG p. 78–79Exercise 5-1, SG p. 79ResearchResearch historical changes to the definitions of disease. Consider, e.g., pregnancy, menopause, alcoholism. IM p. 52EvaluationCheckpoint 5-1: What is disease? p. 91; PPt 18Checkpoint 5-2: Name several categories of disease. p. 91; PPt 18 |  |

*Legend*: IM, Instructor’s Manual; IR, Instructor Resources at <http://thepoint.lww.com/MemmlerHBHD14e>; PPt, PowerPoint; SG, Study Guide; SR, Student Resources at <http://thepoint.lww.com/MemmlerHBHD14e>.**Learning Objective 5-2. Explain the meaning of a *predisposing* cause of disease, and list seven such causes.**

| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Etiology—study of cause of a disease or theory of its origins
* Predisposing causes—factors known to contribute to disease production
* Age—tissues degenerate with time, become less capable of normal function. Some diseases more common at specific ages
* Gender—certain diseases more characteristic of one gender than another, e.g., adult-onset diabetes
* Heredity—genetic “tendency”
* Living conditions and lifestyle
* Environmental conditions (e.g., overcrowding)
* Poor personal choices (e.g., diet, sleep patterns, substance abuse)
* Emotional disturbance—emotional distress contributes to physical problems, e.g., ulcers
* Physical/chemical damage
* Injuries may predispose to infection and degeneration
* Environmental toxins, including harmful agents in the workplace
* Preexisting illness—presence of a disease can increase vulnerability
* Idiopathic—without known cause
* Iatrogenic—result of adverse effects of treatment
 | 91 | 16 |  | In-Class ActivitiesAsk students to contribute other examples of predisposing causes not already mentioned in class. IM p. 53 | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercise 5-2, SG p. 79Many diets claim to increase disease resistance by incorporating “healthy foods.” Ask students to investigate the truth of these claims. Suggestions: broccoli, fish. IM p. 52Ask students to research if there is any known connection between disease and global warming. IM p. 54EvaluationCheckpoint 5-3: What is the definition of a predisposing cause of disease? p. 91; PPt 18Checkpoint 5-4: List several predisposing causes of disease. p. 91; PPt 18 |  |

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**Learning Objective 5-3. Describe the science of epidemiology, and cite some types of studies done in that field.**

| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Epidemiology—study of diseases in populations, involves collecting statistics:
* Incidence—number of cases in a population in a specific time period
* Prevalence—frequency of a disease in a given group or population
* Mortality rate—percentage of a population that dies of a given disease within a given time period
* Epidemic—many people in a region acquiring the same disease
* Endemic—a given disease found to a lesser extent but continuously, e.g., common cold
* Pandemic—global appearance of a disease, in a country, continent, or the whole world
 | 91 | 17 | FigureFig. 5-2: Influenza pandemic, p. 92; PPt 17 | In-Class ActivitiesHave students name as many epidemics and/or pandemics as they can, e.g., bubonic plague, Spanish flu, SARS, AIDS. | Outside AssignmentsQuestions for Study and Review, pp. 111–113EvaluationCheckpoint 5-5: Identify three types of statistics typically collected by epidemiologists, p. 91; PPt 18 |  |

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| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Diagnosis—conclusion as to nature of the illness; based on
* Symptoms—conditions of disease noted by patient
* Signs—objective manifestations
* Syndrome—characteristic group of symptoms and signs
* Disease classified by duration and severity:
* Acute—relatively severe but usually short lived
* Subacute—intermediate between acute and chronic
* Chronic—less severe but likely to be long lasting
* Prognosis—prediction of the probable outcome of the disease
* Therapy—treatment for the disease, many forms:
* Physical therapy
* Occupational therapy
* Respiratory therapy
* Nutritional therapy
* Counseling and support for psychiatric illness
 | 92 | 19–23 | **Figures**Fig. 5-3: Physical therapy, p. 93; PPt 21Web Chart 5.1 (and 5.1 Continued): Disease terminology(Web Figures and Charts are available from the SR and IR on thePoint)**Features**Box 5-1: A Closer Look: The CDC: Making People Safer and Healthier, p. 94 |  | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercises 5-3 and 5-4, SG p. 80Develop a fictional case study using the various terms. IM p. 54Explore some historical epidemics using web searches or the resources listed in the IM p. 55EvaluationCheckpoint 5-6: What is the identification of an illness called? p. 94; PPt 24Checkpoint 5-7: What is a symptom? A sign? p. 94; PPt 24 |  |

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**Learning Objective 5-5. Define *complementary and alternative medicine*; cite four alternative or complementary fields of practice.**

| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Complementary and alternative medicine (CAM):
* Methods of disease prevention or treatment
* Used with or in place of traditional methods
* Long history in other countries
* Examples
	+ - Naturopathy
		- Chiropractic
		- Acupuncture
		- Biofeedback
		- Herbal remedies
		- Exercise, massage, yoga, meditation, etc.
* NIH established National Center for Complementary and Alternative Medicine
* FDA does not regulate botanical supplements sold over the counter
* U.S. Office of Dietary Supplements supports research on botanicals
* Prevention of disease and health education an increased focus of health care
 | 93 | 22 |  | In-Class ActivitiesAsk students if they are aware of any remedies once considered “alternative” but now accepted by mainstream medicine, e.g., use of folic acid during pregnancy. | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercise 5-5, SG p. 81Assign students to investigate the validity of different complementary and alternative medical practices using the National Institutes of Health (NIH) Web site. National Center for Complementary and Alternative Medicine. Available at [http://www.nccam.nih.gov](http://nccam.nih.gov/). Compare findings with results at less reputable Web sites. IM pp. 55–56 |  |

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**Learning Objective 5-6. Explain methods by which microorganisms can be transmitted from one host to another.**

| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Microorganisms (microbes, germs)
* Some are pathogenic, cause illness
* Cause local or systemic infection
* Opportunistic infections when host weakened
* Microbe living in or on a host is called a parasite
* Communicable disease—transmitted from one person to another
* Microorganisms transmitted through
* Infected humans
	+ - Directly
			* Touching
			* Shaking hands
			* Kissing
			* Sexual intercourse
		- Indirectly
			* Touched objects, such as bedding, food, etc.
			* Through atmosphere (sneezing, coughing)
* Vectors—an insect or animal that transmits a disease-causing organism (e.g., insects, rats, fleas, lice)
* Portals of entry and exit
* Skin
* Respiratory tract
* Digestive system
* Urinary and reproductive systems
* Control infectious disease by breaking “chain of infection”
 | 94 | 26–27 | **Figures**Web Fig. 5-1: Modes of disease transmissionWeb Fig. 5-2: Various medical instruments and apparatus that may serve as inanimate vectors of infection (fomites)Web Chart 5-2: Common routes of transmission of infectious diseases | In-Class ActivitiesWatch video: Microbe Invasion, a graphic account of microbe transmission. IM p. 56MaterialsVideo, video player | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercise 5-6, SG p. 81Explore different modes of transmission used by microorganisms, e.g., West Nile virus, mad cow disease. Use Web sites of WHO and CDC. IM p. 56EvaluationCheckpoint 5-8: What is the relationship between a parasite and a host? p. 95; PPt 28Checkpoint 5-9: What is a communicable disease? p. 95; PPt 28Checkpoint 5-10: What term describes any disease-causing organism? p. 95; PPt 28Checkpoint 5-11: What are some portals of entry and exit for microorganisms? p. 95; PPt 28 |  |

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| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Types of organisms and related field of study within microbiology (Table 5-1)
* Bacteria (bacteriology) (Figs. 5-4 to 5-8)
	+ - Simple, single cell
		- Can live in many environments, largest group of pathogens
		- No true nucleus
		- Endospores—resistant to disinfection, airborne, dangerous, e.g., tetanus, botulism, anthrax (Fig. 5-4)
		- Flagella and pili provide locomotion (Fig. 5-5)
* Viruses (virology) (Figs. 5-9 and 5-10)
	+ - Tiny
		- Nucleic acid and protein
		- Reproduce in living cells
		- Obligate intracellular parasites
		- Not susceptible to antibiotics, must be treated with antiviral drugs
		- Classified according to
			* DNA or RNA
			* Is nucleic acid double or single stranded
* Prions—infectious proteins smaller and simpler than viruses
	+ - Slow-growing, hard to destroy
		- Affect and degenerate brain tissue
		- Mad cow disease; Creutzfeldt-Jakob disease
* Fungi (mycology) (Fig. 5-11)
	+ - Have a nucleus
		- Nongreen
		- Single-cell forms (yeasts)
		- Filamentous forms (molds)
		- Fungal diseases
			* Called mycotic
			* Examples: athlete’s foot, ringworm, *Candida*
* Protozoa (protozoology) (Fig. 5-12)
	+ - Single cell with a nucleus
		- Four main divisions
			* Amoebas
			* Ciliates
			* Flagellates
			* Sporozoa (apicomplexans)
		- Animal-like
* Algae (algology)
	+ - Simple aquatic plants
		- Not parasitic
		- Rarely cause disease
 | 95 | 30–45 | **Tables**Table 5-1: Organisms studied in microbiology, p. 95; PPt 30Appendix 3-1: Bacterial Diseases, pp. 615–616Appendix 3-2: Viral Diseases, pp. 617–618Appendix 3-3: Prion Diseases, p. 619Appendix 3-4: Fungal Diseases, p. 619Appendix 3-5: Protozoal Diseases, p. 620**Figures**Fig. 5-4: Endospores, p. 97; PPt 33Fig. 5-5: Flagella, p. 97; PPt 33Fig. 5-6: Cocci (Gram stained), p. 98; PPt 36Fig. 5-7: Bacilli, p. 98; PPt 37Fig. 5-8: Curved rods, p. 99; PPt 38Fig. 5.9: Virus size comparison, p. 99; PPt 41Fig. 5-10: Virus structure, p. 100; PPt 40Fig. 5-11: Fungi, p. 100; PPt 43Fig. 5-12: Some parasitic protozoa, p. 101; PPt 45Web Fig. 5-3: Flagella.Web Fig. 5-4: Pili.(Web Figures and Charts are available from the SR and IR on thePoint) | In-Class ActivitiesPrepare a chart comparing the characteristics of bacteria, viruses, fungi, protozoa, and prions (chart used for Learning Objective 8). IM p. 57Have students look at slides of harmful and beneficial bacterial under the microscope. IM p. 57MaterialsChart paperMarkersBacteria slidesMicroscope | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercises 5-7 through 5-10, SG pp. 82–85EvaluationCheckpoint 5-12: What categories of organisms are studied in microbiology? p. 98; PPt 39Checkpoint 5-14: What are resistant forms of bacteria called? p. 98; PPt 39Checkpoint 5-15: What are the three basic shapes of bacteria? p. 98; PPt 39Checkpoint 5-16: How do viruses differ from bacteria? p. 102; PPt 46Checkpoint 5-17: What type of microorganism causes a mycotic infection? p. 102; PPt 46Checkpoint 5-18: What group of microorganisms is most animal-like? p. 102; PPt 46 |  |

*Legend*: IM, Instructor’s Manual; IR, Instructor Resources at <http://thepoint.lww.com/MemmlerHBHD14e>; PPt, PowerPoint; SG, Study Guide; SR, Student Resources at <http://thepoint.lww.com/MemmlerHBHD14e>.**Learning Objective 5-8. Define *microbiome*, and explain its value.**

| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Microbiome is also referred to as *normal flora*
* Populations of microorganisms normally found on and within our bodies
* Beneficial in producing vitamin K and other nutrients
* Prevent growth of harmful organisms
* Are necessary to well-being
 | 96 | 36 | **Features**Box 5.2: Hot Topics: Our Welcome Guests, the Microbiome, p. 96 | In-Class ActivitiesDemonstrate complexity of microbiome by swabbing parts of body. Incubate samples for 1 day. IM pp. 58–59MaterialsSterile cotton swabsSterile waterNutrient agar plates | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercise 5-11, SG p. 85EvaluationCheckpoint 5-13: What terms refers to microorganisms that normally live in or on the body? p. 98; PPt 39 |  |

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Learning Objective **5-9. List some diseases caused by each type of microorganism.**

| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Infectious diseases from microorganisms
* Bacteria
	+ - Bacterial pneumonia
		- Anthrax
		- Strep throat
		- Urinary tract infection
		- Syphilis
* Viruses
	+ - Viral pneumonia
		- Common cold
		- Influenza
		- AIDS
		- West Nile
* Fungal diseases
	+ - Vaginitis
		- Aspergillosis
* Protozoa diseases
	+ - Amebic dysentery
		- African sleeping sickness
		- Malaria
		- Toxoplasmosis
 | 96 | N/A | **Tables**Appendix 3-1: Bacterial Diseases, pp. 633–635Appendix 3-2: Viral Diseases, pp. 635–636Appendix 3-3:, Prion Diseases, p. 636Appendix 3-4: Fungal Diseases, p. 637Appendix 3-5: Protozoal Diseases, p. 637 | In-Class ActivitiesAdd diseases to chart prepared for Learning Objectives 5–7. IM p. 59Discuss “mad cow disease” and other emerging diseases after watching the video “Emerging Diseases: Prions and Viruses”MaterialsChart prepared for Learning Objective 5-7, markerVideos, video player | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercise 5-12, SG p. 85Have students prepare 5-minute classroom presentations on different diseases, highlighting cause, transmission, and symptoms. IM p. 59 |  |

*Legend*: IM, Instructor’s Manual; IR, Instructor Resources at <http://thepoint.lww.com/MemmlerHBHD14e>; PPt, PowerPoint; SG, Study Guide; SR, Student Resources at [http://thepoint.lww.com/MemmlerHBHD14e](LP_Chapter_02.docx).

**Learning Objective 5-10. Name two categories of parasitic worms, and give examples of each.**

| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Helminths (parasitic worms)
* Infestation = presence in body
* Helminthology—study of parasitic worms
* Ascaris (Fig. 5-13A) most common roundworm
* Long, white-yellow, pointed both ends
* Ascariasis: infestation of lungs or intestines
* Eggs deposited with feces
* Pinworms
* Common in children
* Live in large intestine
* Eggs deposited in anal vicinity, where cause itching
* Hookworms
* Suck blood, cause severe anemia
* Eggs deposited with feces, larvae can penetrate skin of bare feet
* Travel from blood, to lungs, to digestive tract
* Trichina (Fig. 5-13B)
* Small roundworm
* Transmitted in meat of pork or wild game
* Travels from intestines to muscles
* Causes trichinosis
* Filaria (Figs. 5-13C and 5-14)
* Tiny, threadlike, transmitted by flies and mosquitoes
* Cause filariasis, and if they clog lymphatic vessels, elephantiasis
* Flatworms (Fig. 5-15)
* Resemble long ribbons or shape of leaf (flukes)
* Can grow in intestinal tract to 1.5 to 15 m (Fig. 5-15A,B)
 | 102 | 48–50 | FiguresFig. 5-13: Common parasitic roundworms, p. 102; PPt 49Fig. 5-14: Filariasis, p. 103; PPt 48Fig. 5-15: Flatworms, p. 104; PPt 50Web Fig. 5-5: *Filaria loa* in a peripheral blood smear. | In-Class ActivitiesDiscuss worm-related diseases after viewing the video, “Parasites: Eating Us Alive”MaterialsVideo, video player | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercise 5-13, SG p. 86EvaluationCheckpoint 5-19: What is the study of worms called? p. 104; PPt 52 |  |

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| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Diverse group of organisms
* Includes insects and arachnids
* Feed on blood
* Act as disease vectors
* Infestations
	1. May not be fatal but cause significant discomfort
	2. Head lice
	3. Body lice
	4. Scabies
 | 103 | 51 | FiguresFig. 5-16: Arthropods, p. 104; PPt 51 |  | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercise 5-14, SG p. 86**Evaluation**Checkpoint 5-20: Name two types of arthropods, p. 104; PPt 52 |  |

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| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Causes of emergence and spread of microorganisms
* Increase in population density
* Poor sanitation in urban areas
* Disruption of animal habitat, creating greater animal–human contact (e.g., AIDS, SARS)
* Increased travel, especially air travel
* Medical advances keep people alive longer, but in debilitated state and subject to opportunistic infections
 | 105 | 54 |  | In-Class ActivitiesDiscuss the factors contributing to the rise in antibiotic resistance and the increased spread of infectious diseases after watching the video “Fighting the Microbes: A History of Antibiotics”MaterialsVideo, video player | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercise 5-15, SG p. 87 |  |

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| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Fundamental public health considerations:
* Sewage and garbage disposal, ideally to processing plant
* Water purification
	+ - Municipal
		- Industrial
* Preventing food contamination
	+ - National, state, and local laws oversee some food activities
		- Monitoring restaurants, factories, food distribution centers
		- Compulsory inspection of food-handling site
* Milk pasteurization
 | 105 | 55 |  | In-Class ActivitiesHave students read “From Flush to Farm” and discuss the hazards associated with the use of sludge as a fertilizer. IM p. 61MaterialsArticle: “From Flush to Farm” | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercise 5-16, SG p. 87 |  |

*Legend*: IM, Instructor’s Manual; IR, Instructor Resources at <http://thepoint.lww.com/MemmlerHBHD14e>; PPt, PowerPoint; SG, Study Guide; SR, Student Resources at <http://thepoint.lww.com/MemmlerHBHD14e>.**Learning Objective 5-14. Differentiate between *sterilization* and *disinfection,* and give three examples of each.**

| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Aseptic methods—designed to kill, remove, or prevent the growth of microbes
* Sterilization
* Most powerful, kills every microorganism
* Uses extreme heat, ethylene oxide (a gas), boiling water
	+ - Autoclave—steam under pressure, most common method
* Disinfection
* Less powerful—kills all pathogens except spores, not necessarily all microbes
* Uses chemicals, especially bleach, applied to surfaces
* Disinfectants, bactericides, and germicides: alternative terms for same agent
* Antisepsis
* Pathogens prevented from multiplying (bacteriostasis)
* Only procedure safe for living tissue
* Uses alcohol, organic iodine solutions, hydrogen peroxide (antiseptics)
 | 105 | 56 | FiguresFig. 5-17: Aseptic methods, p. 106; PPt 56 | In-Class ActivitiesPrepare cultures by cleaning a dirty utensil or some other area with rubbing alcohol, then bleach, and finally boiling water, culturing after each cleaning. IM p. 62MaterialsRubbing alcoholBleachSterile cotton swabsNutrient agar plates | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercise 5-17, SG p. 88**Evaluation**Checkpoint 5-21: What are the two levels of asepsis? p. 108; PPt 59 |  |

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| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Infection control techniques:
* Stemmed from spread of HIV and HepB in 1980s
* Body substance Precautions
* Healthcare personnel must always wear barrier, e.g., gloves, for any contact with moist body substances, mucous membranes, nonintact skin
* Wear gloves for each patient contact; change gloves between patients
* Use protective coverings
* Dispose of needles safely; do not recap
* Soiled linens, trash, waste, treat as contaminated and dispose of properly
* Take precautions for infections spread by air
* Handwashing—single most important measure in any setting
* Occupational Safety and Health Administration (OSHA)
	+ - Government agency
		- Sets health and safety standards for workers
 | 106 | 57 |  | In-Class ActivitiesInvestigate government regulations that minimize spread of disease: [www.osha.gov](https://www.osha.gov/) (under Safety and Health).MaterialsOccupational Health and Safety Administration home page[www.osha.gov](https://www.osha.gov/) | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercise 5-18, SG p. 88EvaluationCheckpoint 5-22: What is the single most important measure for preventing the spread of infection? p. 108; PPt 59 |  |

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| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Antimicrobial agents kill/inhibit microorganisms
* Antibiotics (antibacterial agents)
* Kill or arrest growth of bacteria
* Produced by living cells; most derived from fungi and soil bacteria
* A danger: development of opportunistic infections, especially with broad-spectrum antibiotics
* Widespread use resulted in natural selection of pathogens resistant to antibiotics
	+ - Serious problem
		- Important to complete course of treatment
* Nosocomial (hospital-acquired) infection troublesome in elderly and immunocompromised people
* Examples: MRSA, VRE
* Antiviral agents
* Not many effective, each limited range of action
	+ - Block removal of protein coat
		- Block production of viral nucleic acid
		- Block enzymes need to assemble and release new virus particles
* Viruses can mutate quickly to become resistant
 | 107 | 58 |  | In-Class ActivitiesDiscuss the ethical implications of HIV medications in African countries. IM p. 63 | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercise 5-19, SG p. 89EvaluationCheckpoint 5-23: What is an antibiotic? p. 108; PPt 59 |  |

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| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| Laboratory identification of pathogens* Specimens studied:
* Blood, spinal fluid, feces, urine, sputum, and swabs from other areas
* Bacterial isolation and tests (Fig. 5-17)
* Specimens grown in media
* Culture and sensitivity (C&S) tests
* Staining (Fig. 5-18)
* Colored dyes make cells visible under microscope
* Gram stain most common procedure—certain organisms are Gram-positive or Gram-negative
* Acid-fast stain
* Other methods of identification
* Shape
* Growth characteristics
* Oxygen requirements
	+ - Aerobic
		- Anaerobic
* Response to test chemicals
* Immunologic identity
* Genetic analysis
* Polymerase chain reaction (PCR)
 | 108 | 60–62 | FiguresFig. 5-18: Isolated colonies of bacteria growing on a solid medium, p. 108; PPt 61Fig. 5-19: Gram-stained bacteria, p. 108; PPt 61 | In-Class ActivitiesHave students identify bacteria based on their morphology and their Gram staining. IM p. 64MaterialsWard’s Gram Staining and Bacterial Morphology Lab Activity | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercise 5-20, SG p. 89EvaluationCheckpoint 5-24: What are the dyes used to color microorganisms called? p. 109; PPt 63 |  |

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| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Influenza virus particles attached to epithelial cells in Maria’s respiratory passages
* Particles were internalized by endocytosis
* The viral RNA directed the epithelial cell to produce new viral mRNA
* New viral mRNA was translated into viral proteins
* The viral proteins and RNA combined to make new viruses, which were released from the cells, damaging the cells in the process
* Maria’s body responded by increasing her body temperature (fever) and “encouraging” her to stay in bed and conserve energy.
 | 89, 109 | 64–68 |  | In-Class ActivitiesHave students integrate information from entire chapter by going through each Learning Objective and relating it to Maria. IM, p. 65 | Outside AssignmentsQuestions for Study and Review, pp. 111–113Exercise 5-21, SG p. 90 |  |

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| Lecture Outline |  |  | Figures, Tables, and Features | Resources and In-Class Activities | Outside Assignments/Evaluation | Instructor’s Notes |
| --- | --- | --- | --- | --- | --- | --- |
| Content | Text Page | PPt Slide |  |  |  |  |
| * Medical words built from standardized word parts

Study of disease: *psychiatry, predisposing idiopathic, iatrogenic, pandemic, syndrome, chiropractic** + - *psych/o (mind)*
		- *pre- (before)*
		- *idio (self, separate, distinct)*
		- *iatro (physician, medicine)*
		- *pan- (all)*
* Disease treatment: syndrome, chiropractic
	+ - *syn- (together)*
		- *chir/o (hand)*
* Infectious disease: *mycology, aerobic, anaerobic, toxins, diplococci, streptococci, staphylococci, pyogenes*
	+ - *myc/o (fungus)*
		- *aer/o (air, gas)*
		- *an- (absent, deficient, lack of)*
		- *tox/o (poison)*
		- *diplo- (double)*
		- *strepto- (chain)*
		- *staphylo- (grapelike cluster)*
		- *py/o (pus*)
* Microbial control: *aseptic, bactericide*
	+ - *septic (poison, rot, decay)*
		- *–cide (kill or destroy)*
 | 111 | 69–72 | Word Anatomy Table, p. 105 | In-Class ActivitiesAsk students to make up their own words, using the word parts provided in the Word Anatomy Chart in combination with other words. The rest of the class could try to guess the meaning, e.g., a *fungicide* kills fungi.**CHAPTER WRAP-UP AND REVIEW**Review the Chapter Wrap-Up Summary Overview flowchart, p. 110 | Outside AssignmentsExercise 5-22, SG p. 90**CHAPTER WRAP-UP AND REVIEW****Outside Assignment**Making the Connections, SG p. 91Selected or all of the exercises in Testing Your Knowledge, SG pp. 92–97Expanding Your Horizons, SG p. 97Have students work through the online interactive exercises for Chapter 5 (SR).EvaluationCreate an exam for Chapter 5 using the Test Generator supplied on thePoint (IR). |  |

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