Introduction (p. 746)

1. The urinary system regulates the chemical composition and volume of the blood and excretes nitrogenous waste and water.
2. The reproductive system produces gametes for reproduction and, in the female, supports the growing embryo.
3. Microbial diseases of these systems can result from infection from an outside source or from opportunistic infection by members of the normal microbiota.

Structure and Function of the Urinary System (p. 747)

1. Urine is transported from the kidneys through ureters to the urinary bladder and is eliminated through the urethra.
2. Valves prevent urine from flowing back to the urinary bladder and kidneys.
3. The flushing action of urine and normal urine itself have some antimicrobial value.

Structure and Function of the Reproductive Systems (pp. 747–748)

1. The female reproductive system consists of two ovaries, two uterine tubes, the uterus, the cervix, the vagina, and the external genitals.
2. The male reproductive system consists of two testes, ducts, accessory glands, and the penis; seminal fluid leaves the male body through the urethra.

Normal Microbiota of the Urinary and Reproductive Systems (p. 748)

1. The urinary bladder and upper urinary tract are sterile under normal conditions.
2. Lactobacilli dominate the vaginal microbiota during the reproductive years.
3. The male urethra is normally sterile.
Diseases of the Urinary System (pp. 749–751)

Bacterial Diseases of the Urinary System (pp. 749–751)

1. Urethritis, cystitis, and ureteritis are terms describing inflammations of tissues of the lower urinary tract.
2. Pyelonephritis can result from lower urinary tract infections or from systemic bacterial infections.
3. Opportunistic gram-negative bacteria from the intestines often cause urinary tract infections.
4. Nosocomial infections following catheterization occur in the urinary system. *E. coli* causes more than half of these infections.
5. Treatment of urinary tract infections depends on the isolation and antibiotic sensitivity testing of the causative agents.

Cystitis (p. 749)

6. Inflammation of the urinary bladder, or cystitis, is common in females.
7. Microorganisms at the opening of the urethra and along the length of the urethra, careless personal hygiene, and sexual intercourse contribute to the high incidence of cystitis in females.
8. The most common etiologies are *E. coli* and *Staphylococcus saprophyticus*.

Pyelonephritis (p. 749)

9. Inflammation of the kidneys, or pyelonephritis, is usually a complication of lower urinary tract infections.
10. About 75% of pyelonephritis cases are caused by *E. coli*.

Leptospirosis (pp. 749–751)

11. The spirochete *Leptospira interrogans* is the cause of leptospirosis.
12. The disease is transmitted to humans by urine-contaminated water.
13. Leptospirosis is characterized by chills, fever, headache, and muscle aches.
Diseases of the Reproductive Systems (pp. 751–762)

Bacterial Diseases of the Reproductive Systems (pp. 751–762)

1. Most diseases of the reproductive system are sexually transmitted diseases (STDs), now called sexually transmitted infections (STIs).
2. Most STIs can be prevented by the use of condoms and are treated with antibiotics.

Gonorrhea (pp. 751–755)

3. *Neisseria gonorrhoeae* causes gonorrhea.
4. Gonorrhea is a common reportable communicable disease in the United States.
5. *N. gonorrhoeae* attaches to mucosal cells of the oral-pharyngeal area, genitals, eyes, and rectum by means of fimbriae.
6. Symptoms in men are painful urination and pus discharge. Blockage of the urethra and sterility are complications of untreated cases.
7. Women might be asymptomatic unless the infection spreads to the uterus and uterine tubes (see pelvic inflammatory disease).
8. Gonorrheal endocarditis, gonorrheal meningitis, and gonorrheal arthritis are complications that can affect both sexes if gonorrheal infections are untreated.
9. Ophthalmia neonatorum is an eye infection acquired by infants during passage through the birth canal of an infected mother.
10. Gonorrhea is diagnosed by ELISA or nucleic acid amplification.

Nongonococcal Urethritis (NGU) (pp. 755–757)

11. Most cases of nongonococcal urethritis (NGU) or nonspecific urethritis (NSU), are caused by *Chlamydia trachomatis*.
12. *C. trachomatis* infection is the most common STI.
13. Symptoms of NGU are often mild or lacking, although uterine tube inflammation and sterility may occur.
14. *C. trachomatis* can be transmitted to infants’ eyes at birth.
15. Diagnosis is based on the detection of chlamydial DNA in urine.
16. *Ureaplasma urealyticum* and *Mycoplasma hominis* also cause NGU.
Microbiology Chapter 26 Outline

Pelvic Inflammatory Disease (PID) (p. 757)

17. Extensive bacterial infection of the female pelvic organs, especially of the reproductive system, is called pelvic inflammatory disease (PID).

18. PID is caused by *N. gonorrhoeae*, *C. trachomatis*, and other bacteria that gain access to the uterine tubes. Infection of the uterine tubes is called salpingitis.

Syphilis (pp. 757–760)

19. Syphilis is caused by *Treponema pallidum*, a spirochete that has not been cultured in vitro. Laboratory cultures are grown in rabbits or cell cultures.

20. The primary lesion is a small, hard-based chancre at the site of infection. The bacteria then invade the blood and lymphatic system, and the chancre spontaneously heals.

21. The appearance of a widely disseminated rash on the skin and mucous membranes marks the secondary stage. Spirochetes are present in the lesions of the rash.

22. The patient enters a latent period after the secondary lesions spontaneously heal.

23. At least 10 years after the secondary lesion, tertiary lesions called gummas can appear on many organs.

24. Congenital syphilis, resulting from *T. pallidum* crossing the placenta during the latent period, can cause neurological damage in the newborn.

25. *T. pallidum* is identifiable through darkfield microscopy of fluid from primary and secondary lesions.

26. Many serological tests, such as VDRL, RPR, and FTA-ABS, can be used to detect the presence of antibodies against *T. pallidum* during any stage of the disease.

Lymphogranuloma Venereum (LGV) (pp. 760–761)

27. *C. trachomatis* causes lymphogranuloma venereum (LGV), which is primarily a disease of tropical and subtropical regions.

28. The bacteria are spread in the lymph system and cause enlargement of the lymph nodes, obstruction of lymph vessels, and swelling of the external genitals.

29. Diagnosis is usually by detection of antibodies of *C. trachomatis*.

Chancroid (Soft Chancre) (p. 761)

30. Chancroid, a swollen, painful ulcer on the mucous membranes of the genitals or mouth, is caused by *Haemophilus ducreyi*. 
Bacterial Vaginosis (pp. 761–762)

31. Bacterial vaginosis is an infection without inflammation caused by *Gardnerella vaginalis*.

32. Diagnosis of *G. vaginalis* is based on increased vaginal pH, fishy odor, and the presence of clue cells.

Viral Diseases of the Reproductive Systems (pp. 762–764)

Genital Herpes (pp. 762–763)

1. Herpes simplex viruses (HSV-1 and HSV-2) cause genital herpes.
2. Symptoms of the infection are painful urination, genital irritation, and fluid-filled vesicles.
3. The virus might enter a latent stage in nerve cells. Vesicles reappear following trauma and hormonal changes.
4. Neonatal herpes is contracted during fetal development or birth. It can result in neurological damage or infant fatalities.

Genital Warts (pp. 763–764)

5. Human papillomaviruses cause warts.
6. Some human papillomaviruses that cause genital warts have been associated with cancer of the cervix.

AIDS (p. 764)

7. AIDS is a sexually transmitted disease of the immune system (see Chapter 19, pages 534–544).

Fungal Disease of the Reproductive Systems (pp. 764–765)

Candidiasis (p. 765)

1. *Candida albicans* causes NGU in men and vulvovaginal candidiasis, or yeast infection, in women.
2. Vulvovaginal candidiasis is characterized by lesions that produce itching and irritation.
3. Predisposing factors are pregnancy, diabetes, tumors, and broad-spectrum antibacterial chemotherapy.

4. Diagnosis is based on observation of the fungus and its isolation from lesions.

Protozoan Disease of the Reproductive System (pp. 765–767)

Trichomoniasis (pp. 765–767)

1. *Trichomonas vaginalis* causes trichomoniasis when the pH of the vagina increases.

2. Diagnosis is based on observation of the protozoa in purulent discharges from the site of infection.

The TORCH Panel of Tests (p. 767)

3. Antibodies against specific diseases that can infect a fetus are detected by the TORCH tests.