I. Bones and Bony Landmarks of the Knee Region

1. Bones of the Knee Region (figure 5.1, page 165)
   1. Femur
   2. Tibia
   3. Patella
2. Bony Landmarks of the Knee Region (figure 5.1, page 165)
   1. Bony landmarks of the femur
3. Femoral condyles (medial condyle and lateral condyle)
4. Femoral groove
   1. Bony landmarks of the tibia
5. Tibial plateau (figure 5.4, page 167)
6. Tibial tuberosity
   1. Bony landmark of the patella
7. Facets (figure 5.14C, page 179)

II. Joint Structure and Movements of the Knee

1. Knee Joint Classification and Movements
   1. Articulating bony landmarks:
   2. Technical name:
   3. Type of joint:
   4. Movements: Flexion-extension (with some external rotation–internal rotation in the horizontal plane when the knee is flexed)  
      (Figure 5.2, page 165—Know the joint movements and be able to identify these movements on a similar figure or from movement descriptions that will be used for the test.)
2. Knee Joint Capsule and Key Ligaments
   1. Strong capsule
   2. Key ligaments provide additional stability (figure 5.3, page 166).
      1. Medial collateral ligament  
         Location:  
         Function:
      2. Lateral collateral ligament  
         Location:  
         Function:
      3. Anterior cruciate ligament  
         Location:  
         Function:
      4. Posterior cruciate ligament  
         Location:  
         Function:
3. Specialized Structures of the Knee
   1. Menisci (figure 5.4, page 167)
      1. Description:
      2. Function:
   2. Bursae (figure 5.5, page 168)
   3. Iliotibial band
      1. Description:
      2. Function:

III. Description and Functions of Individual Knee Muscles

1. Anterior Muscles of the Knee (Common action is knee extension.)
   1. Quadriceps femoris (figure 5.6, page 169)
      1. Rectus femoris  
         Actions:
      2. Vastii muscles: Vastus medialis, vastus intermedius, vastus lateralis  
         Action:
2. Posterior Muscles of Knee (Common action is knee flexion.)
   1. Hamstrings (Common actions are hip extension, knee flexion; figure 5.7, page 171.)
      1. Biceps femoris  
         Location: Lateral  
         Actions:
      2. Semitendinosus  
         Location: Medial  
         Actions:
      3. Semimembranosus  
         Location: Medial  
         Actions:
   2. Popliteus (figure 5.7B, page 171)
      1. Actions: Helps unlock the knee to allow flexion in closed kinematic chain conditions (such as when standing).
   3. Gastrocnemius
      1. Actions:
3. Additional Secondary Muscles of the Knee
   1. Gracilis, sartorius, and tensor fasciae latae (via iliotibial band) also contribute to knee stability and movements.
   2. Pes anserinus (figure 5.8, page 173)
      1. Attachment site for the following muscles:
      2. Location:
4. Summary of Knee Muscle Locations and Actions
   1. Muscle names and actions—Know the names, general locations (i.e., anterior or posterior), and actions of the muscles in table 5.1, page 173.
   2. Muscle names and specific locations—Know the names and locations of the muscles shown in figures 5.9 (A only) and 5.10 (A only), page 174. Similar figures will be on the test, and you will be asked to identify muscles that have arrows pointing to them.

IV. Knee Alignment and Common Deviations

1. Common Deviations (figure 5.11, page 175)
2. Genu valgum (knock-knees)
3. Genu varum (bowed legs)
4. Genu recurvatum (hyperextended knees)
5. Tibial torsion (rotation of the lower tibia relative to the upper tibia) shown in chapter 6, figure 6.27 (page 226)

V. Knee Mechanics

1. Knee Rotation
2. Amount of knee rotation permitted is influenced by knee position with greater rotation of the tibia possible when the knee is flexed versus extended.
   * 1. Stability is favored when the knee is in:
     2. Movement potential is enhanced in:
3. Locking Mechanism of the Knee (figure 5.13, page 178)
4. Definition:
5. Function:

VI. Structure and Movements of the Patellofemoral Joint (figure 5.14, page 179)

1. Type of Joint
   1. The patella is a sesamoid bone formed within the tendon of the quadriceps femoris muscle (not a true joint).
2. Articulating Bony Landmarks
   1. Femoral groove
   2. Facets of patella
3. Functions of the Patella
   1. Increases torque (figure 5.15, page 179).
   2. Centralizes the divergent pull of the quadriceps.
   3. Serves as a retainer.
   4. Decreases friction.
   5. Distributes compression stress.
4. Movements of the Patella
   1. Slight and complex
   2. Patellar tracking
5. Muscles of the Patellofemoral Joint (figure 5.14A, page 179)
   1. Quadriceps femoris is the most important and has the most direct influence.

VII. Patellofemoral Alignment and the Q Angle

1. The Q angle (quadriceps angle; figure 5.16, page 180)
2. Definition:
3. Landmarks:

VIII. Patellofemoral Mechanics

1. Law of Valgus (figure 5.17, page 182)
   1. Definition:
2. Patellofemoral Compression Force (figure 5.18, page 182)
   1. Definition:
   2. Most important determinants

IX. Muscular Analysis of Fundamental Knee Movements  
(Know the *primary* muscles in table 5.2, page 183, be able to do a movement analysis for the parallel développé to the front as shown in table 5.4, page 186, and be able to match the muscle group strengthened or stretched with a picture or the name of the exercises in tables 5.3 and 5.5, pages 185 and 187.)

1. Knee Flexion
   1. Plane and axis: Sagittal plane, mediolateral axis
   2. Primary muscles:
   3. Examples of movements involving the concentric use of the knee flexors
      1. Strength exercises:
      2. Dance:
2. Knee Extension
   1. Plane and axis: Sagittal plane, mediolateral axis
   2. Primary muscles:
   3. Examples of movements involving the concentric use of the knee extensors
      1. Strength exercises:
      2. Dance:
   4. Sample movement analysis: Parallel développé to the front (table 5.4, page 186)
3. Analysis of Stretches for the Knee  
   (Table 5.5, page 187—Be able to match the muscle group stretched with a picture or the name of the exercises in this table.)
   1. Examples of knee stretches
      1. Knee flexors:
      2. Knee extensors:

X. Key Considerations for the Knee in Whole-Body Movement

1. Actions of Multijoint Muscles
2. Active insufficiency
   * 1. Definition: An inability to produce further movement or range because the muscle is being actively shortened across two or more joints simultaneously.
     2. Example of développé to the front (figure 5.22A, page 188):
3. Passive insufficiency
   * 1. Definition—An inability to produce further movement or range at a joint because the muscle is being passively stretched across two or more joints simultaneously.
     2. Example of développé to the front (figure 5.22B, page 188):

XI. Special Considerations for the Knee in Dance

1. Grand Plié
2. Risks:
3. Benefits:
4. Risk reduction
5. Maintaining turnout and control of descent and rise (avoiding sitting in the bottom)
6. Logical skill progression for beginners
7. Hinge
8. Risks and benefits:
9. Twisting and Valgus Stress of the Knee in Dance
10. Forcing turnout
11. Valgus stress
12. Hyperextended Knees (Concept Demonstration 5.2, page 193)
13. Limit the degree of knee extension by:
14. Limit hip internal rotation as the knee extends by:
15. Overdevelopment of the Quadriceps Femoris
16. Adequate quadriceps strength essential
17. Muscle economy and relative activation of hip muscles can reduce magnitude of required activation of quadriceps femoris

XII. Knee Injuries in Dancers

1. Prevention of Knee Injuries
2. Supplemental strength training of quadriceps femoris and hamstring muscles
3. Adequate flexibility of quadriceps femoris and iliotibial band
4. Sound technique
5. Common Types of Knee Injuries in Dancers
6. Medial collateral ligament injury (figure 5.30, page 195)
   * 1. Structure:
     2. Common symptom:
7. Anterior cruciate ligament injury (figure 5.31, page 196)
   * 1. Structure:
     2. Common symptoms:
8. Meniscus injury (figure 5.32, page 196)
9. Structure:
10. Common symptoms:
11. Patellofemoral pain syndrome (figure 5.33, page 197)
12. Structure:
13. Common symptom:
14. Osgood-Schlatter disease (figure 5.34, page 198)
15. Structure:
16. Common symptoms:
17. Rehabilitation of Knee Injuries
18. Restoration of quadriceps femoris strength and function
19. Hamstring strengthening for balance and support of anterior cruciate function
20. Stretching of the quadriceps femoris, hamstrings, and iliotibial band
21. Neuromuscular training for optimal technique