The Knee Joint

Muscles that cross the Hip and Knee Joints

• Sartorius:
  – Hip flexion Knee flexion

• Rectus Femoris:
  – Hip flexion Knee extension

• Tensor Fasciae Latae:
  – Hip abd., flx. Knee ext
  – tenses fascia latae & extends knee via iliotibial tract

• Biceps Femoris (long head):

Muscles that cross the Hip and Knee Joints

• Semitendinosus

• Semimembranosus

• Gracilis
The knee joint

• Complex structure because of the knee functions:
  – allow mobility (flexion/extension)
  – must have some inherent stability
  – weight bearing joint

The knee joint

• Largest joint in the body.
• Classified as a ginglymus (hinge) joint
• Allows for primarily flexion and extension
• There is, however, some rotation allowed about the knee joint.

Articulating Bones

• Femur
• Tibia
• Patella
• Not part of the knee joint:
  – fibula - it does not articulate with the femur or the patella
Important Structural Landmarks

- Femur
  - lateral and medial condyles
    • convex surface
- Tibia
  - lateral and medial condyles
    • concave surface
  - tibial tuberosity
- Fibula
  - (technically not part of knee, but important structure)

Connective Tissue

- Medial (tibial) Collateral Ligament
- Lateral (fibular) Collateral Ligament
- Cruciate ligaments
  - Anterior (ACL)
  - Posterior (PCL)
  - Named based on attachment point on tibia.
- Menisci
  - medial and lateral

Movements about the knee joint

- Flexion
- Extension
- Internal (inward) rotation
  - Anterior aspect of tibia rotates inward.
- External (outward) rotation
  - Anterior aspect of tibia rotates outward.
Muscles

• Knee Extensors
  – Rectus femoris (two joint muscle)
  – Vastus medialis
  – Vastus intermedius
  – Vastus lateralis

Muscles

• Knee flexors
  – Biceps femoris (long *, short)
  – Semimembranosus *
  – Semitendinosus *
  – Sartorius *
  – Gracilis *
  – Popliteus
  – Gastrocnemius *
  * (* = crosses two joints)

Muscles

• Internal rotation about the knee
  – popliteus
  – semimembranosus
  – semitendinosus
• External rotation about the knee
  – biceps femoris
Popliteus (p104)

- Origin
  - posterior surface of lateral epicondyle of the femur
- Insertion
  - Popliteal surface of the tibia
- Action
  - Knee flexion
  - Internal rotation about the knee

Hamstring Muscles

- Semimembranosus (medial muscle)
- Semitendinosus (medial muscle)
- Biceps Femoris (lateral muscle)
- Actions
  - Knee flexion
  - Hip extension
  - thigh and leg rotation
    - internal (ST, SM)
    - external (BF)

Biceps Femoris Muscle (p105)

- Origin
  - Long head: ischial tuberosity
  - Short head: posterior aspect (linea aspera) of femur
- Insertion
  - Lateral condyle of the tibia and head of the fibula
- Action
  - Hip extension
  - Knee flexion
  - External rotation of the hip and knee
Semimembranosus Muscle (p106)

- **Origin**
  - Ischial tuberosity
- **Insertion**
  - Postero-superior surface of the medial tibial condyle
- **Action**
  - Hip extension
  - Knee flexion
  - Internal rotation about the hip and knee

Semitendinosus Muscle (p107)

- **Origin**
  - Ischial tuberosity
- **Insertion**
  - Upper anterior medial surface of the tibia
- **Action**
  - Hip extension
  - Knee flexion
  - Internal rotation about the hip and knee

Quadriceps

- Four-headed muscle
  - Rectus Femoris (two joint muscle)
  - Vastus medialis
  - Vastus intermedius
  - Vastus lateralis
Rectus Femoris (p108)

- **Origin**
  - Anterior inferior iliac spine of ilium
  - upper lip of acetabulum
- **Insertion**
  - Superior aspect of patella & tibial tuberosity via patella tendon
- **Action**
  - Hip flexion
  - knee extension

Vastus Intermedius (p109)

- **Origin**
  - upper two thirds of anterior-lateral aspect of femur
- **Insertion**
  - Upper border of patella
  - tibial tuberosity via patella tendon
- **Action**
  - Knee extension

Vastus Lateralis (p110)

- **Origin**
  - inferior border of greater trochanter
  - portion of linea aspera
- **Insertion**
  - lateral border of patella
  - tibial tuberosity via patella tendon
- **Action**
  - knee extension
Vastus Medialis (p111)

- **Origin**
  - linea aspera of femur
- **Insertion**
  - medial aspect of patella
  - tibial tuberosity via patella tendon
- **Action**
  - Knee extension

Knee Summary

- **Bones**
  - femur, tibia, patella
- **Joint**
  - tibiofemoral
- **Movements**
  - flexion, extension, internal rot., external rot.
- **Muscles**
  - Quadriceps, hamstrings, sartorius, gracilis, popliteus