Anatomy: The foot and ankle is designed to provide stability and mobility of the distal lower extremity. The foot and ankle consists of bones (distal tibia and fibula, 7 tarsals, 5 metatarsals, and 14 phalanges), ligaments and muscles. The bones of the foot form many joints which are connected via many different ligaments, strong elastic bands of connective tissue that connect bone to bone. The outside of the ankle is stabilized by the anterior talofibular, calcaneofibular, posterior talofibular, and talocalcaneal ligaments and the tendons of the peroneal longus and peroneal brevis muscles.

- **Talocrural Joint** (Ankle Joint) - synovial hinge joint formed by the distal tibia and fibula of the lower leg and the top of the talus. The talocrural joint is supported medially by the deltoid ligament/medial collateral ligament (tibionavicular, calcaneonavicular, and posterior tibiotalar ligaments) and laterally by the lateral collateral ligament (anterior and posterior talofibular and calcaneofibular ligaments).

- **Subtalar/Talocalcaneal Joint** - this is the articulation between the talus and calcaneus (heel bone). The Subtalar joint is supported by the medial and lateral collateral ligaments, the interosseous talocalcaneal ligament, and the anterior and lateral talocalcaneal ligaments. This joint allows for accommodation to uneven surfaces while walking.

*The 4 primary motions at the ankle are:

1) Dorsiflexion- (ROM 0-20) controlled by the muscle anterior tibialis
2) Plantarflexion- (ROM 0-50) controlled by the gastrocnemius, peroneous longus, and brevis muscles
3) Eversion- (ROM 0-15) controlled by the peroneous longus and brevis muscles
4) Inversion- (ROM 0-35) controlled by tibialis anterior and posterior muscles

Causes/Mechanism of Injury:
Sprains are a result of damage to the ligaments. Sprains occur due to over stretching or tearing of the ligaments. Lateral ankle sprains are the most common and account for 85% of all ankle sprains, the most common ligament to be injured is the anterior talofibular ligament. Ankle sprains are graded on a scale from 1-3.

- **Grade I sprain**- mildest sprain, usually injuries the anterior talofibular ligament and occur when ankle is in the plantarflexed position (toes down).
- **Grade II sprain**- moderate sprain/partial tear, occurs when both the anterior talofibular and calcaneofibular ligaments are injured.
- **Grade III sprain**- the most severe sprain. All lateral ligaments are torn (anterior talofibular, calcaneofibular, posterior talofibular, and talocalcaneal). Grade III sprains contribute to severe ankle instability.
Lateral ankle sprains can occur due to awkward placing of the foot in which the ankle turns down and in. These injuries are commonly seen in individuals that are genetically predisposed to lax ligaments, have weak supporting musculature, walk/train on unstable surfaces, walk in high heel shoes, and participate in athletic events.

Symptoms
Symptoms include localized swelling on outside of the ankle, warmth at joint, discoloration decreased, painful motion, and pain with weight-bearing activities such as standing and walking.

Treatment/Management
Severe sprains should be evaluated by a medical doctor to check for possible fractures and provide a complete assessment of the injury.

*Ankle sprains should immediately be treated using the acronym P-R-I-C-E.

**P** - protect/immobilize with splint, tape, or brace. Elastic wrap will help control swelling. Also the use of assistive devices such as crutches or cane may be needed.

**R** - rest. Do Not stand for prolonged times!

**I** - apply ice pack 20 minutes every 4-5 hours, 3-5 times/day for the first 24-72 hours after injury

**E** - elevate leg above heart to decrease swelling throughout the day and while sleeping.

***Thorough rehabilitation is important to promote healing, restore motion, decrease swelling, improve balance and proprioception, increase strength, and return to prior level of activity while preventing future injuries.

Exercises/post op protocol:

**Goals week 1-2:**
- Decrease swelling
- Decrease pain
- Protect from reinjury

**Exercises:**
- AROM
- Stretch Gastrocnemius
- Isometric strengthening (plantarflexion, dorsiflexion, eversion)

**Goals week 3-4:**
- Increase pain-free ROM
- Begin strengthening
- Begin non-weight bearing proprioceptive training

**Exercises:**
- Continue AROM
- Thera-band strengthening (plantarflexion, dorsiflexion, eversion)
- Quad/hamstring strengthening

**Goals week 4-8**
- Progress strengthening exercises
- Progress proprioceptive training
- Pain free full weight bearing exercises

**Exercises:**
- Balance
- Plyometrics