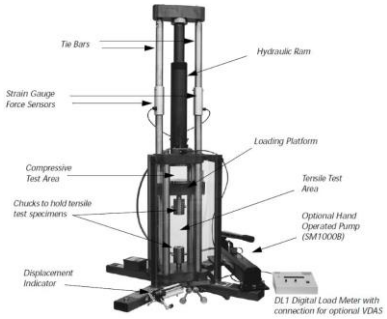
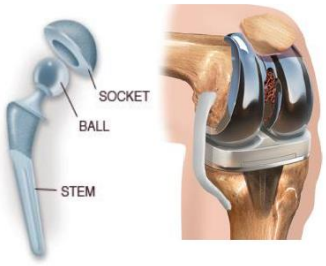
Biomechanics and Rehabilitation Engineering Laboratory

Biomechanics and rehabilitation engineering laboratory is two sections: the first section focuses on the mechanical testing of materials since it plays an important role in evaluating fundamental properties of body tissues and engineering materials. If a material is to be used for biomedical or clinical applications (known as biomaterials), it is required to produce a biomaterial with good mechanical properties. Currently, many types of metals and alloys such as titanium, ceramics, stainless steel, and polymers are used for load-bearing in clinical applications for example dental replacement and bone joining or replacement. Therefore, their mechanical properties are clinically very important because they indicate the selected biomaterials have similar deformable properties to the material they are going to replace. As a result, engineers have developed several experimental techniques for the mechanical testing of engineering materials subjected to tension, compression, bending or torsion loading, cyclic loading, and constant loading.

The second section focuses on human performance analysis via the study and analysis of human motion. In clinical applications, for example, the quantitative analysis of gait variables using kinematic and kinetic characterizations can be helpful to medical doctors in monitoring patient recovery status. In this section, a specific daily motor task will be investigated and visualized via optical motion capture and tracking system called the "Optitrack System." It consists of a series of high-speed synchronous cameras as well as specialized software to locate the markers' locations on the human body segments and joints seen through the cameras. The markers are then recorded as 3D coordinates (xyz); the collected marker data over time creates motion data. Such information can be used to better analyze a person's movements for medical reasons or sports. The motion data can be analyzed by using the Matlab Mocap Toolbox (MCT). Furthermore, joints and segments' angles are obtained by a protractor goniometer. A force plate will be utilized to assess the ground force reactions and their corresponding moments and CoP in some motions that we commonly perform.



Universal Testing Machine



Orthopedic biomaterials

Creep Testing Machine