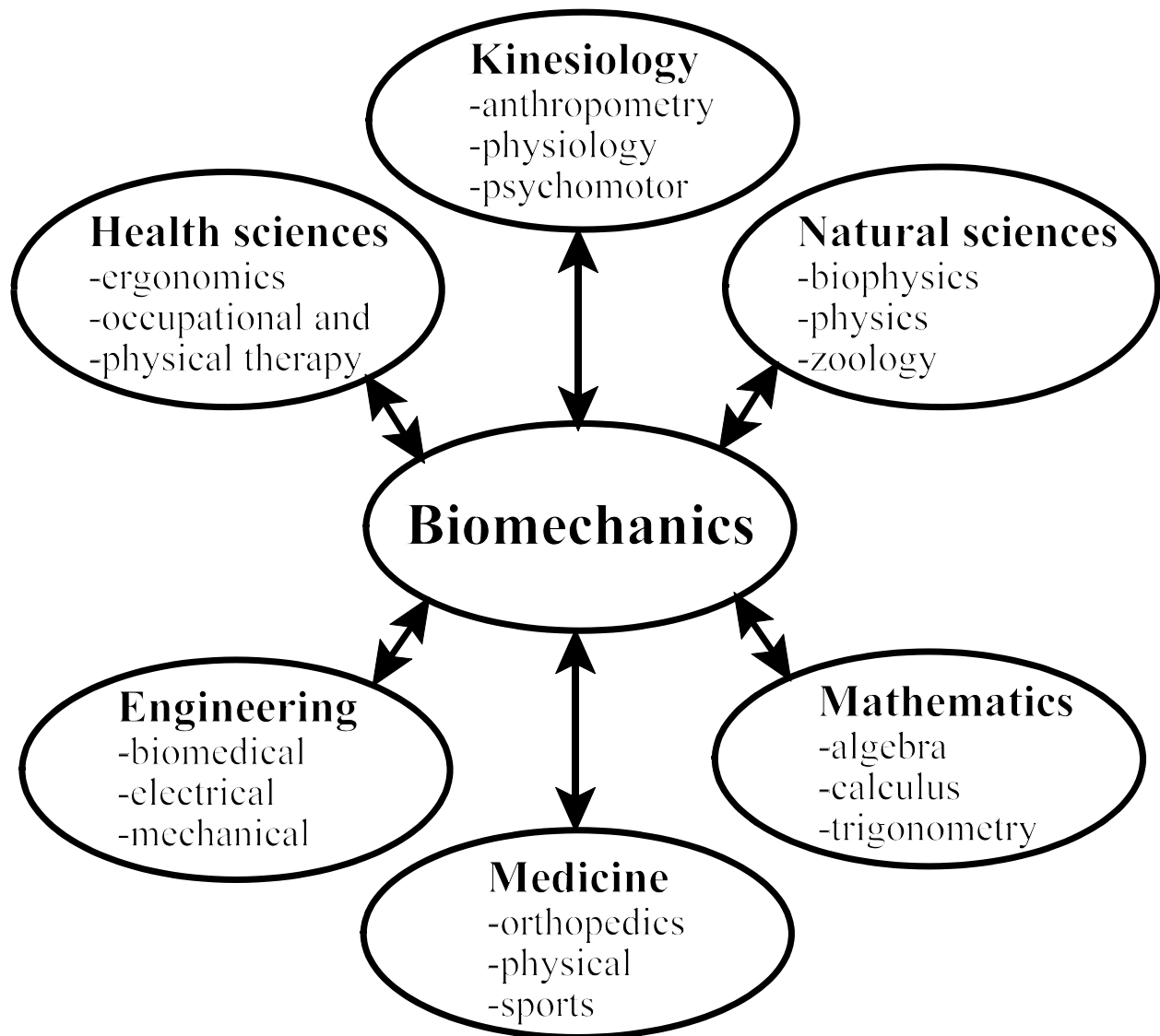


# Biomechanics and Allied Fields



# Definitions

**Mechanics:** science that describes and predicts the conditions of rest or motion of bodies under the action of forces and moments of force

**Biomechanics:** science which describes and predicts the conditions of rest or motion of biological systems under the action of forces and moments of force

**Rigid body:** body that cannot be deformed, stretched or compressed. A body whose particles have fixed positions with respect to each other.

**Statics:** branch of mechanics concerned with bodies at rest or in constant linear motion

**Dynamics:** branch of mechanics concerned with bodies in motion

**Kinematics:** branch of dynamics that describes the state of motion of bodies, for example, their linear and angular displacements, velocities and accelerations without regard to the causes of the motion

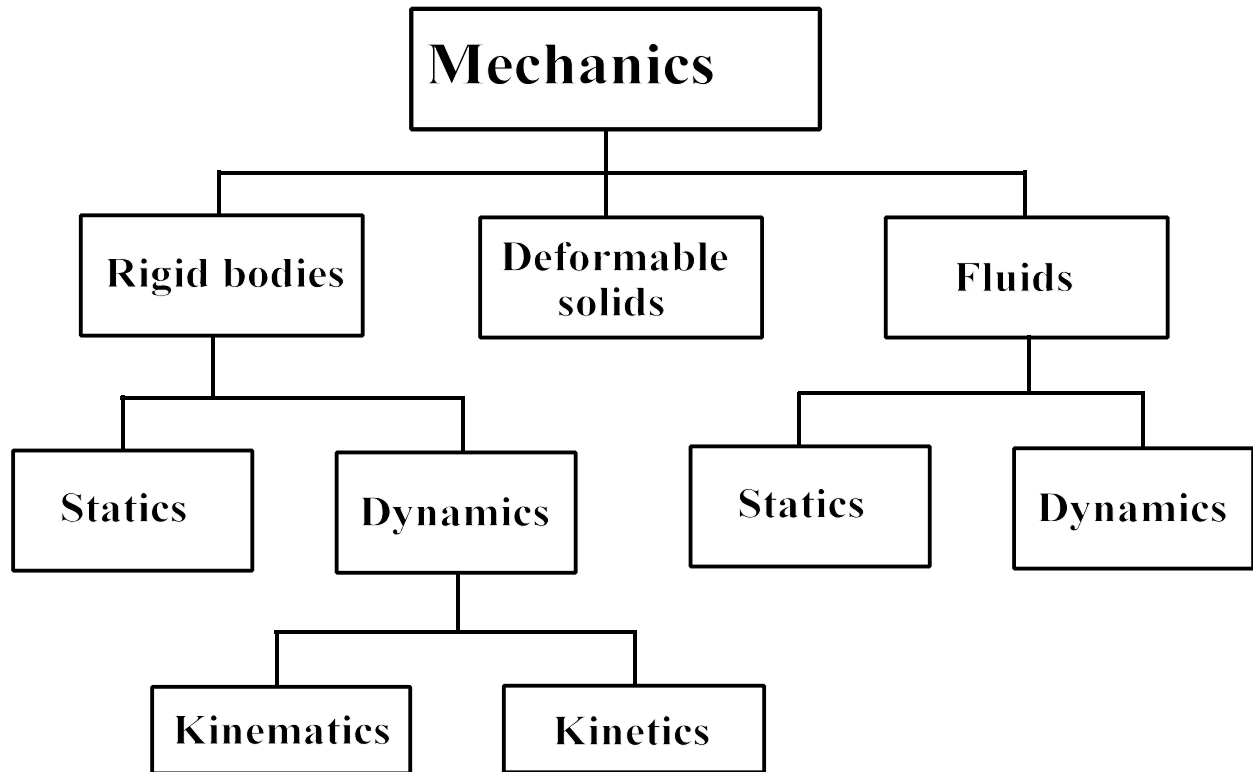
**Kinetics:** branch of dynamics concerned with the causes of motion and the action of forces, including the work, impulse and power of forces and moments of force

**Direct dynamics:** method for computing the kinematics of a body based on the forces and moments of force applied to the body. Usually, this method is considered an engineering field.

**Inverse dynamics:** method for computing forces and/or moments of force based on the kinematics of a body and the body's inertial properties. This method is mostly associated with the field of biomechanics.

**Inertial properties:** mass and mass distribution of bodies, including the location of the mass centres and moments of inertia

# Subdivisions of Mechanics



# Conversion of Units

**Example:** Convert speed of 22.0 metres per second (m/s) to the equivalent speed in miles per hour (mph).

**Step 1** Write out the number and its units using a horizontal format for the denominational part.  
E.g.,

$$22.0 \text{ m/s} \text{ becomes } 22.0 \frac{\text{m}}{\text{s}}$$

**Step 2** Multiply the expression by the ratio of the units you are converting from to the units you are converting to. I.e.,

$$22.0 \frac{\text{m}}{\text{s}} \times \frac{1 \text{ mile}}{1609 \text{ m}}$$

**Step 3** Cancel units where appropriate and reduce the numerical parts.

$$22.0 \frac{\text{m}}{\text{s}} \times \frac{1 \text{ mile}}{1609 \text{ m}} = 0.01367 \frac{\text{miles}}{\text{s}}$$

**Step 4** Repeat steps 2 and 3 if other units need to be converted. I.e.,

$$0.01367 \frac{\text{miles}}{\text{s}} \times \frac{3600 \text{ s}}{1 \text{ h}} = 49.2 \text{ mph}$$

# Numerical Accuracy

To achieve an accuracy of 0.2%, round numbers to three significant figures unless the first significant figure is a one (1), then use four significant figures.

## Examples:

25.333 becomes 25.3

1.4526 becomes 1.453

3452.067 becomes 3450

0.004 568 becomes 0.004 57

1.3333 becomes 1.333

7605.25 becomes 7610