

PHYSIOLOGY

UNIT 4

Combat Academy Instructor Training Programme

PHYSIOLOGY

UNIT 4

Learning Outcomes

The aims of this unit are to enable you to:

- Have a broad based knowledge of how the body moves and can be manipulated.
- To understand the processes and theory of leverage.
- To have an understanding of pressure points in the body and their safe use.

Biomechanics

What is it?

Biomechanics in the context of martial arts is the way that the body moves as a whole unit and can be manipulated. This includes joints that move in one direction, ball joints that move in all direction, range of motion and leverage.

*Biomechanics in sports, can be stated as the muscular, **joint** and skeletal actions of the body during the execution of a given task, skill and/or technique.*

TUTOR TALK



Understanding physiology means a realistic look at your own physical limitations and the ability of your attacker. Physiology and psychology are also linked in as much as all the bodies functions are controlled by the brain and central nervous system. To understand the origins of the physiology of fear one must also delve into the psychology of fear.

Joint / Limbs / Neck / Body

The human body is made up of the following joints (in layman's terms).

Elbow

The elbow joint – a stable joint with one range of motion. This joint can be stressed in three directions: Bi-laterally and posteriorly. A classic example of elbow manipulation would be an arm-bar technique.

Knee

This is the leg's equivalent of the elbow joint and the same as above applies. The knee is also unique inasmuch as there will always be a significant amount of load and pressure in this joint whilst an opponent is standing. Any force such as a well-aimed kick on this joint will cause significant damage.

Shoulder

The shoulder is a relatively unstable ball joint which can be stressed heavily by rotation. Techniques which demonstrate this are: The Americana, the Keylock, the Omoplata and underhook with shoulder rotation.

Limbs

The limbs of the body can also be used as levers to hold and move the body around. Overhooks are a good example of taking a limb and controlling the limb and the body. The Russian lead technique is another good example.

Neck

The neck presents a relatively fragile target and also an optimal lever point which can be used to manipulate the entire body.



Leverage

The Combat Academy system utilises three main biomechanical principals:

Fulcrum/Pivot

Create a fixed point which the body can rotate around. Be aware of your own fulcrums. Move your entire body into a new position rather than be fixed and static which allows the opponent to use your body as a static fulcrum.

Lever

Choose a lever with the furthest distance from the fulcrum. Avoid giving away your own levers.

Force

Apply force against the lever. Absorb or attenuate or neutralise force directed against you. Force is linear! In other words, force is directional as in a punch with all the force directed in a line. If you meet the punch full on, there will be considerable force to attenuate. It takes less force to redirect the punch or move the target (yourself). The same goes if you are being pushed or pulled, rotating or moving laterally will disrupt the direction of the force.

Pressure Points

The body is full of pressure points but what are they?

Pressure points are places on the body that because of their mechanical, structural or vital characteristics can cause pain or incapacitate when pressure or strikes are applied.

The diagram below- fig 1 shows where all the arterial points and junctions are. Also marked on the diagram are pain points, damage and immobilization points and kill-points.

PAIN / IMMOBILIZATION = BLUE

DAMAGE/INCAPACITY = AMBER

KILL-POINTS = RED

Many of the pressure points depicted can be used in the first instance to cause pain by applying pressure. Additional pressure or a firm strike can incapacitate and a full force strike can cause death.

Be aware that in the diagram below, the worst case is depicted and colour coded. For example, a strike to the wrist no matter how hard should not cause death whereas pressure to the jugular notch can cause pain, firm pressure can incapacitate and a full on strike can kill. The same can be said for many of the centre line head and neck and lateral, posterior head and neck attacks.

