**Facilities and services offered by the HPC**

“Being able to test and assess various elements of health, fitness and performance are fundamental aspects of any teaching and learning institution,” says Nelson Mandela Metropolitan University (NMMU) Human Movement Science (HMS) lecturer Mark Kramer.

At NMMU’s new High Performance Complex (HPC), athletes from multiple sport codes ranging from young talented juniors to seasoned professionals are put through their paces.

Housed in the HMS centre within the HPC are several testing laboratories aimed at supporting athletes from various sports codes and the community for athletic performance enhancement.

The laboratories are fully furnished with state-of-the art equipment which further supports athletes or patients seeking assistance. The facility is also a fully functioning Health Professions Council of South Africa (HPCSA) registered practice, offering students supervised work and an integrated learning site within the university.

**Research sprint track**

These labs also house the country’s only 90m fully-enclosed indoor tartan track which includes a state-of-the art integrated system for research consisting of:

* Vicon 3D motion analysis system
* High speed cameras
* Kistler Force Plates embedded into the track and
* The world’s first piezoelectric double force plate starting blocks manufactured by Kistler

The system will not only be used for sophisticated biomechanical analyses of sprinting performance but also for other applications such as speed development in other relevant sports. The system can also be used for rehabilitative purposes.

"The tests these athletes go through are not the usual gymnasium-based tests, but high-end specialised laboratory tests that stress the very limits of their performance.

“We can identify the strengths and weaknesses of each athlete for their particular sport, provide them with a service that places them on the path to achieving their goals,” says Human Movement Science lecturer and Sport Scientist Ryan Raffan.

**Testing**

An athlete entering the HPC will undergo the following: medical, visual and dietetic screening, anthropometric, physical, physiological, biomechanical, perceptual-motor and psychological evaluations depending on the specific requirements and demands of the sport and the environment in which the athlete performs.

**Anthropometric evaluation**

An anthropometric evaluation includes a DEXA scan which determines body fat composition and bone density levels. Weight categorised sports like boxing and endurance-based sports like rowing and weightlifting benefit from controlled levels of body fat.

**Physical evaluation**

A physical evaluation includes flexibility and strength tests to determine the range of motion and strength levels including speed and acceleration. Strength and power-based sports like rugby and netball require athletes to produce a large amount of force in quick time and through each degree of motion and in multi-directions.

**Physiological evaluation**

A physiological evaluation includes testing of VO2max aerobic capacity, economy/efficiency of movement and power profiling. These tests can be performed in extreme environments by simulating extreme temperatures and humidity levels, in the exercise physiology laboratory.

**Biomechanical evaluation**

A biomechanical evaluation includes 3D motion analysis and force distribution patterns to identify how the athlete produces the correct movement while eliminating movement deficiencies. Force data captured during these movements allow for left and right comparisons and the identification of imbalances.

**Perceptual-motor evaluation**

A perceptual-motor evaluation includes reaction time, anticipation and visual skills like hand-eye coordination, speed of recognition, peripheral awareness and decision-making. Eye tracking technology can be employed to measure eye movement while the athlete performs in their sport environment. Skilled-based sports such as cricket, soccer and hockey benefit hugely from identifying what athletes look at and perceive, which once identified can be modified and trained to increase peripheral awareness, speed of recognition and improve hand-eye coordination and anticipate/predict future movement to gain an advantage over those competing.

**Psychological evaluation**

A psychological evaluation includes a mental skills inventory such as level of motivation, goal setting, mental imagery and anxiety control. Assessing the usability of these mental skills can help to give the high performing athlete the edge over an opponent.

**Patients**

In the case of a patient or non-athlete seeking treatment, they will either be referred by a medical practitioner or self-referred for evaluation and treatment of an injury or chronic lifestyle disease.

The patient’s medical history, vitals screening, anthropometric measurements and an orthopedic, chronic or fitness evaluation will be undertaken depending on the requirements of the patient.

**Conditioning**

Individuals who require general conditioning also perform a fitness evaluation whereby their components of health and fitness are assessed and the results are used in the prescription of exercise programmes.

The Biokinetics Unit offers a fully-equipped gym, functional floor space, evaluation laboratories and change room facilities in order for patients to perform their exercise programmes under the supervision of qualified staff who monitor their physical progress.