The innovative facilities at City University London’s Saad Centre for Radiography have opened up new ways of teaching and learning, helping to place City among the leaders in radiography education and research.

There are seven specialised rooms in the Centre, each with state-of-the-art equipment. This advanced technology is available not only to our students, but also to other users for their own professional activities and projects.

The Virtual Environment for Radiotherapy Training (Immersive VERT™ System) facility is the latest addition to the Saad Centre. This self-contained simulated radiotherapy treatment facility is an immersive life-sized virtual environment: a radiotherapy treatment room with 3D projection onto a wall-sized rear projection screen with head-tracked viewing and observation glasses. Combined with specialist software and images, it provides models, simulation, enhanced visualisation and training aids for the treatment of virtual patients. Away from the daily pressures of hospital clinical departments, our student therapeutic radiographers can learn the complexities of radiotherapy treatments and calmly practice the skills needed to treat patients. They use 3D views and life-sized visualisations of the latest models of Varian, Elekta and Siemens Linear Accelerators (Linacs) on virtual patients with realistic CT treatment plans.

With half of our students’ time spent in hospital placements, we have both capacity and facilities throughout the year to explore other applications and opportunities using this advanced equipment within a modern facility supported by our expert academic staff. The availability of this technology in an easily accessible central London location provides an exceptional opportunity for those not directly connected to the Radiography Department. VERT can be used across a range of subjects and disciplines to explore new applications in science and electronic media, develop new 3D concepts and explore their potential with both expert and non-expert users. Its possibilities as an anatomy-training tool are obvious, but it can also benefit teaching specialists, medical biologists, mechanical engineers, electronic games developers and many others. There are also potential research opportunities, for example in training for crime scene investigation.
Funded by the Department of Health, the specialist equipment, supplied by Virtalis, uses sophisticated 3D projectors situated in their own control room to provide life-sized 3D visualisation with real-time interactive navigation. Rear projected onto a large-scale screen in an adjacent room, the specially designed software, developed by Vertual Ltd, includes models of a radiotherapy treatment room, three versions of a Linear Accelerator treatment machine (Linac), a patient couch and various aids, replicating a clinical treatment room. VERT puts a model of a patient on the treatment couch by loading the anatomy image and a treatment plan in DICOM RT format, as used by the majority of radiotherapy planning systems. This enables students and tutors to build up their own databases of patient cases for training purposes. VERT can be used in two modes: ‘demonstrator’ mode for classroom-style teaching or ‘hands-on’ mode where a trainee acquires practical skills such as patient set-up and treatment preparation. Using a total immersion headset and a handheld radiotherapy treatment control pendant, students can develop and enhance their clinical skills in the use and application of radiotherapy treatments on virtual patients. They can import their own plans created on the centre’s Varian Eclipse radiotherapy treatment planning system, and then view them as a simulation in VERT - all whilst being observed by their lecturers and fellow students. VERT also provides the following additional training tools:

• Automated collision detection between the equipment and the patient
• Visualisation aids to explain the ‘isocentre’ concept
• Automated placement of permanent skin marks on the virtual patient
• A tool to provide a quantified set-up error for the position of a patient.

This innovative facility is designed to address the increased demand for student therapeutic radiographers and to overcome limited access to equipment in busy clinical departments. It also offers a platform and resource for multidisciplinary radiotherapy training. In addition to its prime radiography training purpose, this sophisticated equipment can be utilised for a wide range of teaching and research applications, as well as other, more commercial projects. VERT could also provide additional opportunities for Therapy Radiographers to progress their careers by achieving individual competencies away from departmental and patient pressures. There is scope for further use in the assessment of new treatment techniques for individual departments. The VERT room equipment can be used with most virtual reality software programmes and the ‘in-room’ control desk and PC enable users both to view and to control applications and interaction.
Specifications

Hardware provided by Virtalis:

- 3D projector x2 – Active triple DLP projectors
- 3000 lumens. Refresh rate 100 Hz
- Dual projection system, screen resolution of 2240*1024 pixels
- A range of available lens options
- Screen size of 308 x 233 cm
- 3D viewing via circular polarised glasses
- 30 x Nuvison active stereo LCD shutter 3D glasses
- IRED blasters x2 – IRED control of 3D glasses
- 1 x Nuvison 3D glasses with device for tracking head movements
- Tracking system x1 – motion analysis system for tracking trainee
- Hand held Linac control pendants for Varian, Elekta and Siemens
- In room Control desk and monitor/pc
- PC x1 – high spec PC NVIDIA graphics card. Windows XP. Dual LCD monitors
- Control system – 1x touch panel control 18 cm, 1x matrix switch with audio
- Audio x1 – 5.1 audio system.

Immersive VERT™ System Software provided by Vertual Ltd:

- Virtual radiotherapy treatment room with Varian CX & iX, Elekta Synergy and Siemens Artiste Linacs, with the availability of:
  - Treatment couch
  - On board CT imagers and various treatment aids
  - User control of virtual Linac and couch via actual hand pendants.

Virtual treatment room includes the following simulation:

- Full articulation of the Linac, couch and the multi-leaf collimator (MLC)
- Control of the virtual equipment using one of three actual Linac control pendants (Varian, Elekta and Siemens)
- Displays of the in-room monitor providing Linac status information
- Room lasers to assist patient set-up
- Skin surface display to aid patient set-up.

VERT visualisations including:

- Views of patient anatomy; planning CT data sets
- View from treatment beam position
- Visualisation of treatment beams and their constituent segments
- Numerous visualisations of radiation dose distributions, (e.g. isodose surfaces, dose colourwash on surface of tumour and surrounding organs)
- Information available via the model or virtual buttons in scene.
You'll find the cost of using the VERT room on the separate Price List.

For more information about our facilities and to discuss how you could benefit from using the VERT room at the Saad Centre, please contact:

Business Development Manager
Radiography Department
Call: 020 7040 5567
Email: saadcentre@city.ac.uk