

Course Title: The development of 3D printed functional medical phantoms

Course Description

- To teach the skills and concepts necessary to create successful 3D prints
- demonstrate how to create 3D printed models from medical image data
- How to develop high quality, functional 3D prints as anatomical and surgical teaching aids

There are three primary branches to the proposed workshop. The first part will include a short overview of existing 3D printing technologies. Tips and considerations for preparation of 3D print models. The second part is to explain how to load and manipulate 3D medical image data, use simple image processing tools to extract volumes and structures from the images, export those volumes into 3D printing software where they can refine and repair their models. The third part is to demonstrate how to use 3D printing techniques to develop a set of functional 3D prints for use as anatomical and surgical teaching aids. As an example, Rib and kidney models will be used.

Course benefits

Objectives:

- *Learn main 3D printing techniques and their pros and cons
- *Explain basic image processing and volume extraction techniques (SEG3D, Slicer)
- *Summarize the design and material considerations for realistic anatomical models
- *Show a number of successful models.

The first part of the course will benefit to those who is not familiar with 3D printing. Second and third part of the course will be of interest to students and professionals from medical biomedical and engineering backgrounds, who wish to learn basic image processing and volume extraction techniques. The materials will make it possible to develop 3D models from medical images which can be used as a learning aid to help visualise anatomy. Moreover, these will be of great help to medical and surgical students who need free access to anatomical models, and also to students from associated fields who wish to gain a hands-on understanding of surgical training and planning.

Intended Audience

The designed course will be useful particularly to the students with engineering or medical backgrounds who has an interest in image processing and 3D printing. Technician and medical professionals who involved in research activities and require functional realistic models for surgical training and planning. Lecturers and those associated with teaching will benefit from knowing how to create anatomical models using 3D printing.

Biography

Daniil Nikitichev has earned a PhD degree from University of Dundee (2012) in Laser Physics. The same year he joined the University College London, UK. He is involved both in research and teaching. He is a Fellow of the Higher Education Academy and Honorary Fellow of the University College London Hospital. His research topics include 3D printing, acoustic properties of 3D printed materials, acoustic sensors, photoacoustic imaging, optical and photoacoustic phantoms.