**Beginners Guide to Microscopy**

**Introduction**

Microscopy is a fundamental skill required across all areas of human and natural sciences at all levels of study. Therefore, it is a key threshold concept within several degree programmes, often aligned with modular intended learning outcomes or assessments. However, from our experience, many students struggle to conceptualise written protocols on microscopy due to the lack of ability to visualise the methodology or convert from text into practical use.

With the demand for admission to programmes aligned to human and natural sciences there is an even greater demand on academic staff to teach microscopy to ever increasing cohort sizes. This put significant strain on staff time, to ensure all students are able to meet this core threshold concept to an equitable standard. Furthermore, many students are hesitant to seek help if they are struggling with this concept due to potential anxieties, or fears of exhibiting a lack of knowledge. In addition, students with complex additional requirements, for example autism, attention deficit hyperactivity disorder (ADHD) and dyslexia may have further confounding factors, impacting their ability to seek support or understand solely written guides. Despite visual materials such as videos and simulations being present on virtual learning environments, engagement with these resources for laboratory-based modules is limited with on average less than 10% of cohorts consistently reviewing these materials. This indicates that the majority of students mainly focus on content directly provided with sessions, meaning that addition visual approaches, which translate to laboratory environment are required.

We also highlight that due to the differences in backgrounds of academic staff within higher education, there may be significant differences in how microscopy is taught between different modules and even within same module if delivery staff vary. This highlights the need for a more standardised approach, to ensure consistency, and allow students the opportunity to consistently repeat practical tasks in an identical fashion, thus enhancing knowledge acquisition and retention.

Based on this we sought to develop a visual and simplistic approach to disseminating this knowledge, co-created with students to ensure suitability for all levels of study.

**Guidance for academic staff**

The Beginners Guide to Microscopy is designed to be full adaptable to the requirements of all educational institutions which require conventional light-field microscopy as a part of their curricular. Within the guide we utilise images of the equipment used at the University of Salford, however, the document is provided in a way which is modifiable for academics to adapt to the equipment which they have. This is recommended to ensure enhanced student experience and to avoid confusion for your student populations. It is also highly adaptable to different languages, thus completely modifiable to meet international requirements.

We have also provided a trouble shooting guide and checklist to allow students to independently problem solve any issues they may be facing in first instance before seeking further academic support. This seeks to allow academics to better support students as common issues should have been checked by the student, with only more complex challenges requiring academic support. This also seeks to give student the opportunity to learn key problem-solving skills, something which is commonly required within employment.

**For utilisation/embedding**

1. Download the Microsoft Word file “Beginners Guide to Microscopy”
2. Modify any text/images to be appropriate for your cohort.
3. Print as an additional supplement to teaching or include within laboratory protocols books.
4. Digital copies can also be provided via virtual learning environments as a pre-learning resource.

**Testimonials from students**

On a scale of 1-5, with ‘1’ being poor and ‘5’ being very good/helpful:

* 11 students scored it 5/5.
* 5 students scored it 4.5/5.

General comments from the students:

* I have taken a photo of the instructions as I found it really helpful.
* Very precise, step-by-step instructions.
* I didn't realise I needed to use the condenser.
* Troubleshoot page is really helpful.
* Images make it easy to follow.
* I liked it, easy to follow.