Teaching contemporary microscopy for postgraduate coursework : shaping the work ready graduates of the future

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Microscopy techniques play a critical role in modern research, diagnostic or analytical laboratories. Whilst new microscopic techniques are rapidly increasing in number and sophistication, the foundation principles of robust experimental design remain. Workplaces require graduates who are not only familiar with the latest imaging technologies, but who also have the ability to plan and execute robust imaging experiments and who are then capable of collating, interpreting and presenting the scientific data in a variety of formats. We have designed a subject in *Advanced Microscopy and Imaging* for a postgraduate coursework degree. Foundation concepts including light (photons and waves), fluorescence (excitation and emission) and optics are reinforced through "flipped" learning practices that combine online modules with interactive tutorial activities. The subject is research inspired and therefore also covers advanced techniques such as super resolution microscopy, FRET, FRAP and lightsheet microscopy. In practicals, student must design and execute their own experimental pipeline, from cell culture through to specimen preparation, labelling and microscopy acquisition. There is an extensive focus on data analysis using FIJI, including thresholding, segmentation and quantitative analytics, through to data presentation (visual and graphic). Results are presented in journal style reports where students must follow the prescribed "instruction to authors". This subject, which consistently rates highly in student satisfaction surveys, provides a set of work ready skills in modern microscopy that are applicable to both diagnostic and research workplaces.