The University Of Sheffield.

DEPARTMENT OF PHYSICS AND ASTRONOMY

PHY393	***Microscopy and Spectroscopy Laboratory***
Acad Year	***20 Credits***
Staff contact	***Dr Zeng Lu - z.lu@sheffield.ac.uk***

Outline Description	This module will develop transferrable skills that will be useful in further experimental project work and industrial science and technology roles. Students will gain hands-on experience using a range of sophisticated experimental techniques to explore physics research and real world context-based questions. Atomic force microscopy (AFM), optical and gamma-ray spectroscopies, as well as associated techniques such as ellipsometry will be used. Students will undertake a series of experiments, supported by lectures, in semester one and conduct an open-ended project utilising the techniques in semester two.
Restrictions	Approved for all PHYU* undergraduate programmes. Satisfies "completion of project" requirement for such programmes.
Prerequisites	None
Co requisites	None
Approx Time allocation (hours)	10 Lectures:, 30 Laboratory Sessions; 158 Independent;
Assessment (%)	Semester 1: Lab work - (Short scientific report 15 %, Peer marked conference style presentation 15 %, Seminar 10 %), Semester 2: Project - (Formal scientific report 50 %, Presentation 10%)
Aims	This unit aims to 1. give students familiarity and hands-on experience with a range of advanced modern experimental techniques. These include: optical microscopy, atomic force microscopy, absorption and photoluminescence spectroscopy, Raman spectroscopy, angular-reflectance spectroscopy, residual gas analysis, temperature-dependent optical and electronic spectroscopy, gamma spectroscopy, ellipsometry and infrared thermometry; 2. provide students with the opportunity to apply these

	techniques in open-ended projects involving fundamental optical, structural and electronic properties, surface characteristics and composition of a range of materials; 3. develop and enhance the students skills in experimental design, data analysis and communication of research results.
Outcomes	By the end of the unit, a candidate will 1. understand the physical principles underlying a series of key experimental techniques used in physics research and gain an appreciation of their wider applications; 2. have direct hands-on experience in using such techniques and be able to analyse the data so collected; 3. have presented, individually or as a member of a pair or group, key principles and findings from the use of such techniques; 4. be able to select a suitable experimental technique to explore a particular physics problem in a research or industrial context; 5. have experience of undertaking an open-ended project that involves the design of an experiment and the collection and analysis of experimental data; 6. have experience of communicating the results of such research through a formal oral presentation and report. These learning outcomes address the requirement of QAA level 6 that candidates should be able to “apply the methods and techniques that they have learned to review, consolidate, extend and apply their knowledge and understanding, and to initiate and carry out projects.”
Recommended Books	
Syllabus	
Academic Notes	