Course Title:	ADVANCED NEUTRON AND SYNCHOTRON METHODS

CONTACT IMFORMATION	
Course Leader	*Dr. Howard Stone and external speakers*
COURSE DETAILS	
Level	*Masters - PhD*
Pre-requistites	*Core X-ray course or similar*
Linked courses	*X-Ray (Core)*
Credits	*10 (for Swansea and Birmingham)*
Total student effort	*100 h approx*
Delivery	*Masterclass lectures from internal and external speakers*
Assessment method(s)	*Assessment of a research proposal to use one or more of the techniques in the students research area.*
Resources needed	
Texts	*Lecture handout*

Course Description: ~150 Words

Briefly describe areas covered indicating depth of coverage

A series of masterclasses run over five days of 2-3 hours each followed by interactive sessions or examples classes in the afternoon.

1. Introduction and Stress (H Stone) An introduction to synchrotron and neutron sources - what is available and how to get beam time. The origins and analysis of residual stresses in engineering components, type I, II & III stresses. Self consistent modelling for the prediction of type II stresses. Computer based EPSC practical using Sy-SCM.

2. Imaging (Tasmin Lafford: ESRF) The principles and practice of imaging using synchrotron radiation including: radiography, topography, tomography and diffraction contrast tomography.

3. Synchrotron diffraction (L Connor & J Parker: Diamond) High resolution and time resolved diffraction for the characterisation of crystal structure and phase transformations. Experimental configurations. Experiment planning and set ups. Diffraction data analysis (structure refinement and automated data analysis for large data sets). Data analysis practical (TOPAS).

4. Diffuse scattering (M Tucker: ISIS) Crystal disorder and the forgotten parts of powder diffraction. Diffuse and total scattering. Practical on the analysis of local structure using GSAS/PDF.

5. Texture (S Birosca & N Jones: MSM, Cambridge) Measurement and analysis of crystallographic texture by diffraction. Experimental setups for determining textural information. Describing texture (pole figure, ODFs). Applications of synchrotron diffraction for textural analysis. Practical on texture analysis using MAUD.

Learning Outcomes: Max 50 words

The participants of the course will have an advanced knowledge of a number of diffraction based techniques and how to access them. They will understand the potential and limitations of these techniques and how to start to interpret the results.