Module Name:	**Design Against Creep Failure**
Module Code:	**EGTM64**
Presenter(s):	**Dr Mark Whittaker /Mr Steve Williams (Rolls-Royce plc)**
Credit Rating:	**10**
Venue:	**College of Engineering, Swansea University**

Synopsis:

The module defines low and high temperature creep in metallic and ceramic based materials. Deformation mechanisms and bulk measurements are described as a basis for predictions of mechanical component behaviour.

Intended Outcomes:

On completion of the module students will demonstrate:

- A critical evaluation of creep data using advanced engineering concepts, ie theta projection method, *the hyperbolic tangent method and the Wilshire equations.*
- *A comprehensive understanding of the parameters controlling creep deformation.*
- *A fundamental appreciation of the link between theoretical aspects of creep mechanisms to industrial in-service applications.*

Module Aims:

To gain a fundamental understanding of deformation mechanisms on the microstructural scale within metals that control macroscopic behaviour under static loading at high temperatures. Models to predict creep behaviour will be introduced in the context of industrial component lifing.

Syllabus:

- *A comprehensive understanding of the parameters controlling creep deformation.*
  - The phenomenon of creep
  - Creep curves at high and low temperatures.
  - Creep testing procedures, including stress-rupture, constant-load and constant-stress machines.
  - Traditional methods for representation of creep data.
  - Logarithmic creep behaviour.
  - Power law representation of high-temperature creep properties.
  - Diffusional creep mechanisms including Nabarro-Herring and Coble creep.
  - Dislocation creep mechanisms at low and high temperature.
  - The concept of independent and sequential processes.
  - Creep fracture behaviour including triple-point cracking and cavitation. Mechanisms of intergranular creep failure.
  - Fracture maps.
  - Alloy effects in creep and creep fracture.
  - Creep of solid solutions and particle-hardened alloys.
- *A fundamental appreciation of the link between theoretical aspects of creep mechanisms to industrial in-service applications.*

Assessment:

5,000 word assignment to be submitted within three weeks, after the course presentation