

**Approval: 10<sup>th</sup> Senate Meeting**

**Course Number:** EN 613  
**Course Name:** Creep-Fatigue Interaction  
**Credits:** 3-0-0-3  
**Prerequisites:** EN 611 (Durability Behavior of Energy Materials)/ Instructor Consent  
**Intended for:** UG/MS/PhD/M.Tech.  
**Semester:** Odd/Even

**Preamble:** This course relates to materials failure behavior when exposed to high temperatures such as a) combustion engines and gas turbines b) boiler materials (heater and steam pipes) c) waste and bio mass incinerators and d) solid oxygen fuel cells.

**Course Outline:** This course focuses on various aspects with particular reference to creep-fatigue failure diagnosis. Creep-fatigue failure can be due to a spectrum of loading conditions ranging from pure cyclic to mainly steady loading with infrequent off-load transients. These require a range of mechanical analysis approaches, a number of which will be discussed.

**Course Modules:**

**Module 1**

High temperature deformation and creep behavior, uniaxial and multi axial creep model, High temp fracture, nucleation and growth of creep, cavities, creep crack nucleation and growth, creep damage theory, and prediction of creep life. (20)

**Module 2**

Creep-fatigue failure diagnosis, Creep-fatigue based design criteria, modeling of creep fatigue interaction and case studies (22)

**References:**

1. High Temperature Deformation and Fracture of Materials, *J-S. Zhang*, ISBN: 978-0-85709-079-9, Woodhead Publishing Ltd, 2010.