

## Project proposal template

### Graduate School studentships

### March 2015

<i>Project title</i>	Early breast cancer diagnosis utilizing Digital Image-based Elasto Tomography (DIET) and Finite Element Analysis
<i>First Supervisor</i>	Dr <input type="text" value="Demetrios T. Venetsanos"/>
<i>Second Supervisor</i>	Dr Dimitrios Markis
<i>School</i>	Mechanical and Automotive Engineering <input type="text"/>
<i>Other member of supervisory team (no more than three KU supervisors in total)</i>	Dr Olga Duran
<i>Specific requirements beyond 2:1 degree</i>	UG or PG studies in Mechanical Engineering or Biomechanical Engineering or equivalent; very good knowledge of CAD/FEA, Matlab, image processing.

**Project summary**  
**(max 4,000 characters)**

Breast cancer is the most common cancer in the UK (48,000 women get breast cancer in Britain each year) and it accounts for 23% of all cancers (excluding non-melanoma) in women. Therefore, early detection of cancerous tissue is of major importance. Towards this direction, Digital Image-based Elasto Tomography (DIET) may be used. DIET is a non-invasive breast cancer screening procedure based on the principles of Experimental Modal Analysis: controlled vibrations are introduced to a breast and the response is recorded as a sequence of images taken with digital cameras. Response disturbances are caused by areas of higher stiffness within the breast (cancerous tumors). The significant advantage of the DIET concept lies in the high contrast difference in elastic properties of 300% to 1500% between cancerous and healthy tissue in the breast. This contrast is an order of magnitude larger than the 510% radiodensity contrast imaged in xray mammography. The contribution of the proposed PhD will be the development of a fully functional DIET system for early breast cancer diagnosis accompanied with all Finite Element Analysis simulations for localizing the tumor and its size.

