

## Project proposal template

### Graduate School studentships

### March 2015

<i>Project title</i>	<input style="width: 95%;" type="text" value="FRP reinforced concrete columns"/>
<i>First Supervisor</i>	Dr <input style="width: 40%;" type="text" value="Diana Petkova"/>
<i>Second Supervisor</i>	<input style="width: 95%;" type="text" value="Dr Ted Donchev"/>
<i>School</i>	<input style="width: 95%;" type="text" value="Civil Engineering and Construction"/>
<i>Other member of supervisory team (no more than three KU supervisors in total)</i>	<input style="width: 80%;" type="text"/>
<i>Specific requirements beyond 2:1 degree</i>	<input style="width: 95%;" type="text"/>

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

Fibre reinforced polymer (FRP) bars have recently been tested as an alternative to steel reinforcement in reinforced concrete beams and slabs. Various studies have focused on FRP reinforcing bars as both longitudinal and shear reinforcement to determine their behaviour and suitability for use under ultimate limit and serviceability limit state. Prestressing of the FRP reinforcement has also been considered including several studies carried out at Kingston University.

The use of FRP bars for internal reinforcement of concrete columns is still a new area for research. The majority of studies prove the beneficial use of FRP wrap on reinforced columns for strengthening but little is known about the effect of the bars on the behaviour of columns. A pilot study carried out at Kingston University has shown that the contribution of the FRP bars to the capacity of concentrically loaded elements is substantial and it could become a viable reinforcement option. With their elastic deformations, high strength and excellent durability the potential for the utilisation of their properties could significantly reduce the percentage of steel reinforcement.

The aim of the proposed project is to design, test and analyse the performance of FRP reinforced concrete columns under concentric and eccentric load. The samples will be designed according to Eurocode 2 and the European and International guidelines for the design of FRP reinforced elements. The experimental work will consist of the design and preparation of medium scale FRP and steel reinforced concrete columns. The experimental results will be used to develop a numerical model in a finite element programme (ANSYS) to verify the impact of the different reinforcement and material properties on the behaviour and failure of the concrete element.

