F21BC Biologically Inspired Computation

**COURSE DETAILS**

**Course Code:** F21BC  
**Full Course Title:** Biologically Inspired Computation  
**SCQF Level:** 11  
**SCAF Credits:** 15  
**Available as Elective:** No

**DELIVERY LEVEL**

- Undergraduate: Yes
- Postgraduate Taught: Yes
- Postgraduate Research: Yes

Additional Information:

**COURSE AIMS**

Traditional computation finds it either difficult or impossible to perform a certain key range of tasks associated with pattern recognition, problem solving and autonomous intelligence. Great progress towards designing software for such tasks has emerged by taking inspiration from a range of natural, mainly biological, systems.

The aims of this course are to:

- introduce an appreciation of the former  
- introduce the main biologically-inspired algorithms and techniques which are now commonly researched and applied  
- establish a practical understanding of the real-world problems to which these techniques may be fruitfully be applied.

**LEARNING OUTCOMES – SUBJECT MASTERY**

- Understanding of limitations of traditional computation.  
- A critical understanding of a range of biologically inspired computation methods, their limitations and areas of applicability.  
- Ability to apply one or more biologically inspired techniques in solving a practical problem.

**LEARNING OUTCOMES – PERSONAL ABILITIES**

- Identify and define approaches that can be used to apply bio-inspired methods to existing problems in optimisation and machine learning.  
- Exercise substantial autonomy and initiative (courseworks) (PDP)  
- Demonstrate critical reflection (courseworks) (PDP).

**SYLLABUS**

- classical vs. biologically-inspired computation,  
- evolutionary algorithms (basic EA design, and how they are applied to a wide range of problems)  
- swarm intelligence (ant colony methods, particle swarm optimisation)
F21BC Biologically Inspired Computation

- neural computation (perceptrons, multilayer perceptrons, associative networks)
- cellular automata

Reassessment for Postgraduate students only

<table>
<thead>
<tr>
<th>COURSE RELATIONSHIPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Code</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>F29AI</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LOCATION AND ASSESSMENT METHODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edi</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>Y</td>
</tr>
<tr>
<td>Y</td>
</tr>
<tr>
<td>Y</td>
</tr>
</tbody>
</table>