## Course descriptor F21BC

<table>
<thead>
<tr>
<th>Course code</th>
<th>F21BC</th>
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<tbody>
<tr>
<td>Course title</td>
<td>Biologically Inspired Computation</td>
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<tr>
<td>Credits</td>
<td>15</td>
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<tr>
<td>School</td>
<td>Mathematics and Computer Sciences</td>
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<tr>
<td>SCQF Level</td>
<td>11</td>
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<tr>
<td>Semester</td>
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### 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 fruitfully be applied.

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

### 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.

#### 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 (coursework) (PDP)
- Demonstrate critical reflection (coursework) (PDP).

| Assessment method   | 50% written examination, 50% coursework |