1. **Title of the module**

COMP8370 (CO837) - Natural Computation

1. **School or partner institution which will be responsible for management of the module**

School of Computing

1. **The level of the module (Level 4, Level 5, Level 6 or Level 7)**

Level 7

1. **The number of credits and the ECTS value which the module represents**

15 credits (7.5 ECTS)

1. **Which term(s) the module is to be taught in (or other teaching pattern)**

Autumn

1. **Prerequisite and co-requisite modules**

An Honours degree in a computing, scientific, engineering, mathematical or other numerate

discipline.

1. **The programmes of study to which the module contributes**

Portfolio of Taught Postgraduate Programmes in Computing

1. **The intended subject specific learning outcomes.  
   On successfully completing the module students will be able to:**

8.1 To be able to describe what is meant by a natural computation paradigm, list a number of natural computing paradigms and give a brief description of each together with some examples of their (actual or potential) applications.

8.2 To be able to select the appropriate technique for a particular problem from a set of problem-solving heuristics based on these natural computing paradigms, and to be able to justify this choice based on a knowledge of the properties and potential of these methods. To be able to compare the general capabilities of a number of such methods and give an overview of their comparative strengths and weaknesses.

8.3 To be able to analyse phenomena from the natural world from the point of view of their being computational systems. To be able to take these phenomena and distinguish between the features which are important for computational problem solving and those that are merely a fact of their realization in the natural world.

8.4 To be able to implement a natural computation system on the computer, and apply this program to the solution of problems.

8.5 To be able to exploit library and online resources to support investigations into these areas.

1. **The intended generic learning outcomes.  
   On successfully completing the module students will be able to:**

9.1 To be able to write coherently and critically about the topics studied in the course, based on readings from the scientific literature and demonstrating an awareness of how to write in a scientific manner.

9.2 To be able to apply mathematical techniques where appropriate.

9.3 To be able to apply appropriate computer programming techniques.

9.4 To be able to apply appropriate scientific principles and methodology.

9.5 To be able to study independently and apply principles and techniques used in the course to new examples.

1. **A synopsis of the curriculum**

There is an increasing use of nature-inspired computational techniques in computer science. These include the use of biology as a source of inspiration for solving computational problems, such as developments in evolutionary algorithms and swarm intelligence. It is therefore proposed to allow students the opportunity to become exposed to these types of methods for use in their late careers.

1. **Reading list (Indicative list, current at time of publication. Reading lists will be published annually)**

Eiben, AE, Smith, JE. (2015) Introduction to Evolutionary Computing, 2nd Edition. Springer.

Dorigo, M. and Stutzle, T. (2004) Ant Colony Optimization, MIT Press.

Barnes, DJ, Chu, D. (2010) Introduction to Modeling for Biosciences, Springer

1. **Learning and teaching methods**

Total contact hours: 22

Private study hours: 128

Total study hours: 150

1. **Assessment methods**
   1. Main assessment methods

One Computational exercise 20%

One short Essay (about 1,000 words) 20%

Examination 60%

13.2 Reassessment methods

Like for like.

1. **Map of module learning outcomes (sections 8 & 9) to learning and teaching methods (section12) and methods of assessment (section 13)**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | *8.1* | *8.2* | *8.3* | *8.4* | *8.5* | *9.1* | *9.2* | *9.3* | *9.4* | *9.5* |  |  |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |  |  |
| Lectures | V | V | V | V | V | V | V | V | V | V |  |  |
| *Private study* | V | V | V | V | V | V | V | V | V | V |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |
| Computational Exercise |  |  |  | V |  |  |  | V | V |  |  |  |
| Short Essay | V | V | V |  | V | V |  |  | V |  |  |  |
| Examination | V | V | V |  |  | V | V |  | V | V |  |  |
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1. **Inclusive module design**

The School recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

1. **Campus(es) or centre(s) where module will be delivered**

Canterbury

1. **Internationalisation**

The topics addressed by this module relate to a field which is of international importance, given the global role of computers in today’s technological innovation. The topics covered by this module are international in nature, being identical worldwide and independent of traditional spoken language.

**FACULTIES SUPPORT OFFICE USE ONLY**

**Revision record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date approved | Major/minor revision | Start date of the delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
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Revised FSO Jan 2018