

School of Computing, Edinburgh Napier University

1. Module number	<i>SET11108</i>
2. Module title	<i>Emergent Computing for Optimisation</i>
3. Module leader	<i>Prof. Emma Hart</i>
4. Tutor with responsibility for this Assessment Student's first point of contact	<i>As above</i>
5. Assessment	<i>Report</i>
6. Weighting	<i>20% of overall module total:</i>
7. Size and/or time limits for assessment	<i>2 pages</i>
8. Deadline of submission Your attention is drawn to the penalties for late submission	Hand-in: 17th October
9. Arrangements for submission	Submit hard copy to the School Office

10. Assessment Regulations All assessments are subject to the University Regulations.	
11. The requirements for the assessment	<i>Please see attached document</i>
12. Special instructions	<i>See attached document</i>
13. Return of work	<i>within 3 weeks of submission.</i>
14. Assessment criteria	<i>See attached document</i> <i>Normal academic conventions for acknowledging sources should be followed.</i>

SET 11108/SET11508 Emergent Computing for Optimisation

Coursework 1: 20% of total module mark

OBJECTIVE

You are asked to produce **a report of maximum 2 sides** describing **two different** applications of an evolutionary computing algorithm (or other bio-inspired algorithm) to a **real-world optimisation** problem. An example is given at the end of this document .

The report should contain two distinct sections – one for each application. Each section should give:

1. a URL to a paper, thesis or other source that describes this application (1 mark)
2. A brief description of the problem being addressed – explaining why this is a difficult problem (3 marks)
3. A description of the representation used (2 marks)
4. A description of the fitness function - state whether the function should be maximised or minimised (2 marks)
5. A short summary of the key findings of the paper (2 marks)

HOW MUCH I EXPECT FROM YOU:

2 sides **maximum** in 11pt font minimum

You don't need to write in paragraphs – bulleted text is fine

It might be helpful to draw a diagram showing the representation or include a diagram to explain the problem

Use google scholar (or just google) and use sensible and creative search keywords. It is not necessary to read each paper in detail – just try and extract the key ideas from each paper

MARKING:

- Each application is marked out of 10
- The two applications should be **different** – for example, if you describe two approaches to designing reinforced concrete frames, I will only mark one of them
- You should find papers that describe real world problems – not applications of search algorithms to toy problems made up by researchers, or benchmark (artificial) data

Total Marks: 20

SUBMISSION

- Submit a paper copy of your report to the school office by the submission date (with a coursework cover sheet)

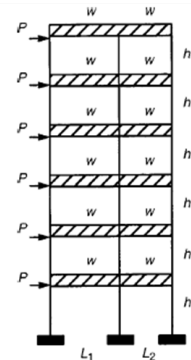
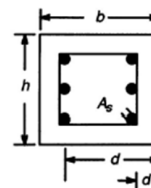
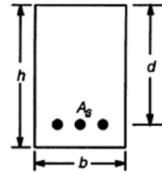
Submission Deadline: Monday 17th October 4pm

This is a minimal example of a submission that would pass but is lacking in details (in the problem section and the summary section in particular). Note that this only describes one application – you need to include applications in your report.

Design of Reinforced Concrete Frames using a Genetic Algorithm

http://www.ce.memphis.edu/pezeshk/PDFs/camp_pezeshk_hakan.pdf

Problem: Design dimensions and steel reinforcement parameters for structural beams meeting building constraints



Various test case scenarios looked at, including the six storey example on the right, involving a set of RC elements

Encoding: simple list of numbers representing depth and height parameters, and number of placement of steel reinforcement sections.

Fitness: calculated with standard equations used by standards bodies

Results: They found that a simple GA worked adequately, leading to small reduction in structural costs while remaining safe and legal.