Faculty of Technology – Course work Specification 2020/21

Module name:	**Computational Intelligence Optimisation**	
Module code:	**IMAT5232**	
Title of the Assignment:	**Tasks Portfolio**	
This coursework item is:	Summative	
This summative coursework will be marked anonymously		No

The learning outcomes that are assessed by this coursework are:

1. Basics of optimisation and mathematical tools
2. Learn about metaheuristics (deterministic, stochastic, evolutionary, swarm intelligence etc.)
3. Achieve some basic programming skills of optimisation algorithms
4. Develop a critical thinking regarding optimisation problems and optimisation

This coursework is:	Individual	

This coursework constitutes 90 % **to the overall module mark.**

Date Set:	**3/01/2021**
Date & Time Due:	**Interim submission 1: 17/02/2021 (23:59 o'clock)** **Interim submission 2: 17/03/2021 (23:59 o'clock)** **Final submission 1: 5/05/2021 (23:59 o'clock)**

Your marked coursework and feedback will be available to you on: 1/06/2020

If for any reason this is not forthcoming by the due date your module leader will let you know why and when it can be expected. The Head of Studies (headofstudies-tec@dmu.ac.uk) should be informed of any issues relating to the return of marked coursework and feedback.

Note that you should normally receive feedback on your coursework by **no later than four working weeks after the formal hand-in date,** provided that you met the submission deadline.

When completed you are required to submit your coursework to:

1. Blackboard (Turnitin link)

Late submission of coursework policy: Late submissions will be processed in accordance with current University regulations which state:
*"the time period during which a student may submit a piece of work late without authorisation and have the work capped at 40% [50% at PG level] if passed is **14 calendar days**. Work submitted unauthorised more than 14 calendar days after the original submission date will receive a mark of 0%. These regulations apply to a student's first attempt at coursework. Work submitted late without authorisation which constitutes reassessment of a previously failed piece of coursework will always receive a mark of 0%."*

Academic Offences and Bad Academic Practices:

These include plagiarism, cheating, collusion, copying work and reuse of your own work, poor referencing or the passing off of somebody else's ideas as your own. If you are in any doubt about what constitutes an academic offence or bad academic practice you must check with your tutor. Further information and details of how DSU can support you, if needed, is available at:
http://www.dmu.ac.uk/dmu-students/the-student-gateway/academic-support-office/academic-offences.aspx and
http://www.dmu.ac.uk/dmu-students/the-student-gateway/academic-support-office/bad-academic-practice.aspx

Tasks to be undertaken:

The coursework consists of the solution of exercises presented and explained during the lectures. Some tasks are maths exercises while others are programming tasks. The last exercise is more creative (algorithmic design) and requires an understanding of the topic on top of programming skills.

A number of "suggested" exercises is proposed on the final lecture slide of each lecture for the students to practice. The students are asked to prepare their submissions by arbitrarily selecting a subset of the suggested exercises as explained in the lectures, and also explicitly indicated in the lecture slides. The student will have to prepare a unique PDF file (the use of LaTeX is strongly encouraged but not mandatory) to be submitted via a Turnitin link. If code has been generated, it can be either attached in the PDF file or submitted in the form of a compressed archive.

Deliverables to be submitted for assessment: The coursework consists of three deliverables: task 1 (**T1)**, task 2 (**T2)** and task 3 (**T3)**, having different submission times. Details are below, and will also be clarified during the first lecture. Moreover, instructions will be also provided within the lecture slides.

T1, due on Week 21 (17/02/2021), consists of 4 mathematical exercises. The student will prepare a pdf file showing step-by-step solutions, as shown in the lectures, of the selected 4 exercises. The first 3 exercises must be arbitrarily chosen amongst those suggested in the last slide of Lecture 1 (exact optimisation in one variable). The fourth exercises amongst in the last slides of lecture 2 (exact optimisation in many variables).

T2, due on Week 28 (17/03/2021), is a programming task. The student is asked to implement four popular testbed problems for optimisation., and one of the single solution algorithms taught in lecture 3-4 of his/her choosing. The latter, will be tested over the implemented 4 problems to produce numerical results. Details are given in the lecture slides. The work done will be presented in a short report (to be submitted on the form of a PDF file). The generated code can either be included in the report, or sent as a separate compressed archive via Turnitin or email.

T3, due on Week 33 (5/05/2021), is the production of a "miniPaper". The student will deliver a short report in the fashion of a conference paper in the field. Examples and guidance will be provided. This task contains a more creative aspect, as the report will present the design of a novel optimiser, e.g. obtained by combining two or more algorithms taught in the lectures. Such algorithm will be compared against at least 1 population-based algorithm (arbitrarily chosen by the students amongst those taught from Lecture 4 to Lecture 9) and 1 single-solution (it can be the one used for **T2**). In total, the miniPaper will contain at least 3 optimisers. The comparative analysis between optimisers can be done by using a provided test-bed suite for optimisation. Real-world applications, i.e. optimisation of a PID controller, Image Processing application, etc., are more than welcomed and can be used to replace the use of benchmarks problems.

N.B.
If a student fails at submitting **T1** (and/or **T2**) on due time, he/she will still have the possibility of submitting **T1** (and/or **T2**) together with **T3**. In this case, the generated pdf file will contain miniPaper, plus and appendix chapter with **T1** and/or **T2**. Similarly, if a student is not satisfied with his/her mark for **T1** and/or **T2,** he/she can resubmit with via the previously explained approach. Obviously, this will cancel the previous submission, and different exercises have to be chosen and solved.
It is strongly suggested to submit at due time as it will give the opportunity of getting feedback during the module.

All the submission have to be made via Turnitin. A link will be set-up. Results and Feedback will be provided electronically via Feedback Studio.

How the work will be marked:

Marks are distributed as follows: 10% Discussion Board, 90% Coursework.

Discussion board: 10 marks are given to students participating on a regular basis who show a proactive attitude towards this module. Marks are reduced if the involvement is particularly poor. Zero marks are given only to those who never used the discussion board before the final submission date.

Coursework: each task is worth a different percentage of marks (**T1**=20% **T2**=30% **T3**=40%).

In details:

-**T1**: each exercise is worth 5%. The mark of 5% will be reduced on the basis of the gravity of possible mistakes and/or omissions.
-**T2**: The mark of 30% will be reduced on the basis of the gravity of possible mistakes and/or omissions. As a general idea, 8% is assigned to the implementation of the 4 problems (2% each), 12% to the implementation of the optimisation algorithm, 5% to the generation and visualisation of numerical results, 5% to your own personal interpretation of the generated results.
-**T3**: The mark of 40% will be reduced on the basis of the gravity of possible mistakes and/or omissions. The marking process will also take into consideration your originality, as well as the readability of the paper and displayed numerical results.

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