## Initial Project Overview

## SOC10101 Honours Project (40 Credits)

### Title of Project:

Evaluating the effects of crossover and mutation operators on an evolutionary algorithm implementation of the travelling salesman problem

### Overview of Project Content and Milestones

1. To research evolutionary algorithm and TSP  
2. To develop a program attempting to solve the TSP using different crossover and mutation operators  
3. To analyse using gathered data the efficiency of the algorithms on benchmark problems  
4. To reach a conclusion based on the effectiveness of each algorithm

### The Main Deliverable(s):

* A piece of software that uses evolutionary algorithms to attempt to solve multiple benchmark travelling salesman problems, using different crossover and mutation operators

### The Target Audience for the Deliverable(s):

School of computing students, academics

### The Work to be Undertaken:

* Researching evolutionary algorithms, travelling salesman problem, crossover and mutation operators using high quality sources
* Producing plan
* Building program
* Creating test plan
* Testing program
* Analysing different crossover and mutation operators on different benchmark problems

### Additional Information / Knowledge Required:

* Extend current knowledge of programming
* Become familiarised with evolutionary algorithms

### Information Sources that Provide a Context for the Project:

Eiben, A. E., & Smith, J. E. (2015). *Introduction to evolutionary computing* (Second edition.). Springer.

Jähne, M., Li, X., & Branke, J. (2009, July). Evolutionary algorithms and multi-objectivization for the travelling salesman problem. In *Proceedings of the 11th Annual conference on Genetic and evolutionary computation* (pp. 595-602).

Katayama, K., Sakamoto, H., & Narihisa, H. (2000). The efficiency of hybrid mutation genetic algorithm for the travelling salesman problem. *Mathematical and Computer Modelling*, *31*(10-12), 197-203.

Larrañaga, P., Kuijpers, C., Murga, R. *et al.* Genetic Algorithms for the Travelling Salesman Problem: A Review of Representations and Operators. *Artificial Intelligence Review* **13,** 129–170 (1999).

Matai, R., Singh, S. P., & Mittal, M. L. (2010). Traveling salesman problem: an overview of applications, formulations, and solution approaches.

### The Importance of the Project:

Travelling Salesman Algorithms have real-world applications such as delivering goods to shops and consumers. Treating these like travelling salesman problems can produce efficient routes for lorry drivers, for example, saving time and money.

### The Key Challenge(s) to be Overcome:

Time management, potential gaps in programming knowledge

Programming and optimising my evolutionary algorithm