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# Fakulti Sains Komputer Dan Matematik

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SCHEDULING NURSE SHIFTS BASED ON THEIR  
PREFERENCE USING GOAL PROGRAMMING APPROACH

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## ABSTRACT

Nurse Scheduling Problem (NSP) is the process of assigning available nurses to predetermined shifts in order to satisfy hospital needs. NSP is incredibly difficult because it is time consuming and also need to satisfy all the hospital requirements and nurses preferences. Bad scheduling can lead to dissatisfaction and frustration among nurses which results in a stressful and demotivating work atmosphere. In this project, a computerised NSP is created using a Goal Programming (GP) model. This model is created to aid in Hospital Tuanku Fauziah (HTF) enhance their manual schedule construction. This hospital has several main planning goals in scheduling their nurses timetable which are converted to be hard and soft constraints of the GP model. This study is using hospital policies as hard constraints and nurses' preference as soft constraints. The complete formulated goal programming model is then solved using the help of LINGO software. The final result shows that the timetable obtained from the GP model gives better schedule compared to manually constructed timetable. Furthermore, this study demonstrates that employing LINGO software to solve the formulated GP model improves nurse satisfaction.

# 1 INTRODUCTION

## 1.1 Research Background

Healthcare systems have faced drastic changes in the last few decades. The development of advanced technology makes the healthcare system as well as additional costs become higher. Hospitals need services and staff around the clock, although there is a difference in workload intensity between day and night work. Therefore, in order to meet the needs of staff at all times, shift work needs to be implemented in healthcare organisations to provide continuous services to patients. Based on Jafari & Haleh (2021), the estimated working hours in shifts are morning, evening and night with different periods, which are then arranged according to the work schedule either fixed or rotating for example 2- or 3-shift schedules work. In general, nurse scheduling can be divided into two types: cyclical and non-cyclical. Cyclical schedule is a timetable that is created for a specific planning period for the entire staff, while the non-cyclical schedule, each nurse should work on a schedule that matches their requirements and preferences. This study used non-cyclical scheduling since it was designed to create a timetable based on the preferences of the nurses.

The Nurse Scheduling Problem (NSP) is the process of assigning available nurses to pre-determined shifts in order to satisfy hospital needs. Nowadays, this problem has attracted a great amount of attention and indirectly become an issue. According to Dumrong Siri & Chongphaisal (2018), a high turnover rate and nursing shortages are important issues in Thailand and many other nations, including the United States. Forty five point five percent of Thai nurses experienced significant stress from working more than 12 hours per day and a bad quality of life, especially among young nurses. Other than that, a study from El Adoly et al. (2018) shows that due to population expansion and numerous difficulties, Egypt also has a lack of personnel and nurses in comparison to the number of patients, which is a cause of many diseases nowadays. According to the secretary of the Nursing Faculty at Cairo University, currently a nurse serves