

**ESTIMATION OF UNEMPLOYEMENT IN MALAYSIA USING  
FOURTH-ORDER TAYLOR'S SERIES METHOD AND FOURTH-  
ORDER RUNGE KUTTA METHOD**

**NUR BATRISYIA BINTI SUHAIMI**

**Thesis Submitted in Fulfilment of the Requirement for  
Bachelor of Science (Hons.) Computational Mathematics in the  
Faculty of Computer and Mathematical Sciences  
Universiti Teknologi MARA**

**July 2021**

## **ABSTRACT**

The number of unemployment increase and decrease in every month but the number always remains high. The data for unemployment in Malaysia can be search at Department of Statistic Malaysia (DOSM) online portal. For this research, mathematical modelling method are used to estimate the data collected from DOSM online portal which is the data of unemployed number in Malaysia. Data collected are from 2015 to 2020 by month. Mathematical modelling method that are used in this research to estimate the number of unemployment are Taylor's series method and Runge-Kutta method where the degree order for both methods are fourth-order. The estimation value of fourth-order Taylor's series method and fourth-order Runge-Kutta method are compared and analysed by using the error analysis. Comparison of error of both methods is to determine which method is more accurate, so that the method will be concluded as the best method for this research. Based on this study, fourth-order Runge-Kutta method is the best method as the method has least total value of error and more accurate. Hence, the number of unemployment in Malaysia for year 2021 to 2025 was estimated using fourth-order Runge-Kutta method.

## **ACKNOWLEDGEMENT**

The outcome of this report required a lot of guidance and assistance from many people and I grateful to have this research complete within the time given.

First, Alhamdulillah and praise to Allah because of His Almighty and blessing. I was given the opportunity and strength into completing this research in the required period of time. I would like to take this opportunity to express my gratitude to my parents who gave me support throughout the process of completing this research.

I would also like to express my special thanks to Dr Norhaslinda binti Zull Pakka as my coordinator and lecturer for this subject, Mathematics Project (MSP600). Her guidance helped me all the time.

In addition, I would like to dedicate this part to show gratitude towards my supervisor, Puan Nursyazni binti Mohamad Sukri who always guided me, gave advice and suggestions in the process of completing this research.

Finally, I would like to thank my classmates and seniors who guided me in so many ways throughout the journey of doing this research.

# TABLE OF CONTENTS

	Page
DECLARATION BY THE SUPERVISOR-----	i
DECLARATION BY THE CANDIDATE-----	ii
ABSTRACT -----	iii
ACKNOWLEDGEMENT -----	iv
TABLE OF CONTENTS -----	v
LIST OF TABLES -----	viii
LIST OF FIGURES -----	ix
INTRODUCTION OF RESEARCH -----	1
1.0 Introduction -----	1
1.1 Background of Study -----	1
1.2 Problem Statement -----	3
1.3 Objectives -----	4
1.4 Significance of the Project -----	4
1.5 Scope of the Project -----	5
1.6 Project Benefits -----	5
1.7 Definition of Terms and Concept -----	6
1.8 Organization of Report -----	6
LITERATURE REVIEW -----	9
2.0 Introduction -----	9
2.1 Literature Review -----	9
2.3 Conclusion -----	11

METHODOLOGY-----	12
3.0 Introduction-----	12
3.1 Methodology-----	12
3.1.1 Taylor Series Method-----	13
3.1.2 Runge-Kutta Method-----	14
3.1.3 Error Measurement-----	16
3.2 Research Step-----	16
3.3 Conclusion-----	19
IMPLEMENTATION-----	20
4.0 Introduction-----	20
4.1 Implementation of Method-----	20
4.1.1 Research Data-----	20
4.1.2 Implementation of Taylor’s Series Method-----	23
4.1.3 Implementation of Rk4 Method-----	28
4.1.4 Error Measurement-----	33
4.1.4.1 Absolute Error-----	33
4.1.4.2 Relative Error-----	37
4.2 Conclusion-----	41
RESULTS AND DISCUSSION-----	42
5.0 Introduction-----	42
5.1 Results and Analysis-----	42
5.1.1 Estimation Results-----	42