

PROJECT TITLE HERE

EMÜ 405 System Analyses and Design I

FINAL REPORT

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# ABSTRACT

**Abstract:**

Write 100–250 words here.

**Key Words:** [keyword1; keyword2; keyword3; ...]

# Contents

<b>1</b>	<b>INTRODUCTION</b>	<b>7</b>
<b>2</b>	<b>LITERATURE REVIEW</b>	<b>7</b>
<b>3</b>	<b>SCOPE OF THE PROJECT</b>	<b>7</b>
3.1	Problem Definition . . . . .	7
3.1.1	UNSDG Consideration for Problem Definition . . . . .	7
3.2	Objectives of the Study . . . . .	7
3.2.1	Real Life Constraints of the Study . . . . .	7
3.2.2	Ethical Considerations . . . . .	7
3.3	Multidisciplinary Approaches and Interactions . . . . .	8
<b>4</b>	<b>METHODOLOGIES</b>	<b>8</b>
4.1	Problem Formulation / Mathematical Model (MILP) . . . . .	8
4.2	Solution Approach . . . . .	8
4.3	Experimental Design (Scenarios) . . . . .	8
<b>5</b>	<b>ANALYSIS AND RESULTS</b>	<b>8</b>
5.1	Analysis . . . . .	8
5.2	Results . . . . .	9
<b>6</b>	<b>DISCUSSIONS</b>	<b>9</b>
6.1	Study limitations . . . . .	9
6.2	Applicability of the project under real life situations . . . . .	9
6.3	Health and Safety Issues . . . . .	9
6.4	Legal Issues . . . . .	9
6.5	Economical Issues and Constraints . . . . .	9
6.6	Sustainability . . . . .	9
6.7	Producibility-Manufacturability . . . . .	10
6.8	Social and Political Issues . . . . .	10

6.9	Environmental Issues . . . . .	10
6.10	Multidisciplinary Collaboration . . . . .	10
<b>7</b>	<b>CONCLUSIONS</b>	<b>10</b>
<b>8</b>	<b>PROJECT PLAN AND FUTURE STUDIES</b>	<b>10</b>
<b>9</b>	<b>REFERENCES</b>	<b>10</b>
<b>10</b>	<b>APPENDIX</b>	<b>11</b>
<b>11</b>	<b>references</b>	<b>11</b>

## List of Figures

# List of Tables

1	Example KPI Summary (replace with your results) . . . . .	9
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# ABBREVIATIONS

- VRP: Vehicle Routing Problem
- VRPSPD: Capacitated Vehicle Routing Problem with Simultaneous Pickup and Delivery
- MILP: Mixed-Integer Linear Programming
- MTZ: Miller–Tucker–Zemlin
- UNSDG: United Nations Sustainable Development Goals

# **1 INTRODUCTION**

Background, motivation, context, and brief report roadmap.

## **2 LITERATURE REVIEW**

Summarize relevant studies; add citations with IEEE style if you use BibTeX later or manual numbering.

## **3 SCOPE OF THE PROJECT**

### **3.1 Problem Definition**

Define the problem clearly.

#### **3.1.1 UNSDG Consideration for Problem Definition**

Which UNSDG(s) are relevant and why.

### **3.2 Objectives of the Study**

- Objective 1: ...
- Objective 2: ...
- Objective 3: ...

#### **3.2.1 Real Life Constraints of the Study**

- Constraint 1 (e.g., capacity, time window, shift, stop count): ...
- Constraint 2: ...

#### **3.2.2 Ethical Considerations**

Fairness, data privacy, workload balance, etc.



### **3.3 Multidisciplinary Approaches and Interactions**

How IE interacts with CS, logistics, operations, etc.

## **4 METHODOLOGIES**

### **4.1 Problem Formulation / Mathematical Model (MILP)**

Insert MILP here.

### **4.2 Solution Approach**

- Solver and version: ...
- Hardware/compute environment: ...
- Time limit / optimality gap: ...

### **4.3 Experimental Design (Scenarios)**

- Scenario 1: ...
- Scenario 2: ...
- Scenario 3: ...

## **5 ANALYSIS AND RESULTS**

### **5.1 Analysis**

Explain methodology of analysis: KPIs, scenario setup, data pipeline, validation checks, etc.

Table 1: Example KPI Summary (replace with your results)

KPI	Scenario 1	Scenario 2	Scenario 3
Total cost			
Urgent backlog (end)			
Normal backlog (end)			
Vehicles used			

## 5.2 Results

# 6 DISCUSSIONS

## 6.1 Study limitations

Limitations: modeling assumptions, data limits, scalability, etc.

## 6.2 Applicability of the project under real life situations

How/when it can be applied; deployment notes. [1]

## 6.3 Health and Safety Issues

Operational safety, driver workload, road safety, etc.

## 6.4 Legal Issues

Data protection, compliance, regulations.

## 6.5 Economical Issues and Constraints

Costs, budget, ROI, constraints.

## 6.6 Sustainability

Emissions, efficiency, UN SDGs, etc.

## **6.7 Producibility-Manufacturability**

If relevant; otherwise justify N/A.

## **6.8 Social and Political Issues**

Equity, social impacts, etc.

## **6.9 Environmental Issues**

Environmental impacts, waste, emissions.

## **6.10 Multidisciplinary Collaboration**

Team coordination, cross-discipline contributions.

# **7 CONCLUSIONS**

Conclude with key findings and what they mean.

# **8 PROJECT PLAN AND FUTURE STUDIES**

Remaining tasks, future improvements, and updated Gantt chart.

# **9 REFERENCES**

## **References**

[1] Author, "Title," Journal/Conference, year.

[2] Author, *Book Title*. Publisher, year.

## 10 APPENDIX

### Appendix A: Additional Tables / Figures

Extra material here.

## 11 references

### References

- [1] United Nations, “Sustainable development goals,” <https://sdgs.un.org/goals>, accessed: 2025-12-29.