1. Instructor Information:

<table>
<thead>
<tr>
<th>Instructor Name</th>
<th>Prof. Ali Handam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office Hours</td>
<td>Sunday, Tuesday, Thursday</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Office Number and Telephone Extension</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Email</td>
<td><a href="mailto:alifirstsem@gmail.com">alifirstsem@gmail.com</a></td>
</tr>
</tbody>
</table>

2. Course Description:

Linear programming introduces the student to a specific mathematical model: the linear programming model. This model has a wide range of applications, and is of interest to practitioners in operations research, statistics, economics management and psychology. This, and the fact that good algorithms can solve huge linear programs, is the reason for the success of this model. The theory of the course treats the simplex algorithm, duality theory, and sensitivity analysis. The theory is accompanied by practical examples that illustrate the power of the model, and teach the student the skill of modelling. After completing this course student will have obtained knowledge of the existing algorithms for linear programming. Students will be able to detect when a problem be solved via linear programming, and model it accordingly. Furthermore student will be able to perform sensitivity analysis.

3. Course Information:

<table>
<thead>
<tr>
<th>Course number: 401384</th>
<th>Course Title: Linear programming</th>
<th>Level: Third year</th>
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</thead>
<tbody>
<tr>
<td>Course Nature: Applied</td>
<td>Prerequisite: 0401241</td>
<td>Lecture time: Sun. Tue. Thu. 10:00 – 11:00</td>
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<tr>
<td>Academic year: 2020 – 2021</td>
<td>Semester: First</td>
<td>Credit Hours: 3</td>
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4. Course Objectives:

1. Able to develop an optimization model from a problem description.
3. Learn the simplex algorithm solving for linear optimization.
4. Develop a fundamental understanding of duality theory.
5. Conduct sensitivity analysis for linear programming problems and interpret the results.
7. Learn interior-point algorithms for solving linear optimization.

5. Intended Student Learning Outcomes:

Successful completion of the course should lead to the following outcomes:

A. Knowledge and Understanding Skills: Student will be able to
   A1) State the theories and concepts used in linear optimization.
   A2) Apply the simplex method in linear optimization.
   A3) Apply interior point methods in linear optimization.

B. Intellectual Analytical and Cognitive Skills: Student will be able to
   B1) Apply appropriate theories, principles and concepts relevant to linear optimization.
   B2) Apply appropriate theories, principles and concepts relevant to duality in linear optimization.

C. Subject-Specific Skills: Student will be able to
   C1) Plan and design applications using techniques and procedures appropriate to the simplex method.
   C2) Plan and design applications using techniques and procedures appropriate to interior point methods.

D. Creativity/Transferable Key Skills/Evaluation: Student will be able to
   D1) Deal with an appropriate effective data relevant to linear optimization.
   D2) Solve linear optimization models using ideas and techniques some of which are at the forefront of the discipline.
6. Course Content:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
</tr>
</thead>
</table>
| 1+2+3 | 1.1 Concept Of Linear Programming L.P.  
1.2 Building (Formulation) Of Linear Programming Model.  
1.3 Forms of Linear Programming Models.  
1.4 General Form of Linear Programming Models.  
1.5 standard Form of Linear Programming Models. |
| 4+5+6 | 2.1 The Graphical Method.  
2.2 The Simplex Method,  
2.3 The (Bis-M) method. |
| 7+8+9+10 | 3.1 The Concept Of Duality Problem.  
3.2 Dual Problem when Primal Modal in Canonical Form,  
3.3 Dual Problem when Primal Modal in Standard Form.  
3.4 Find a Solution for Dual Modal. |
| 11+12+13 | 4.1 Introduction and Definition of Transportation Modal,  
4.2 Balancing of Transportation Modal.  
4.3 Solution Technique of Transportation Modal’  
4.4 North West - corner Method,  
4.5 Least cost Method.  
4.6 Vogel’s Approximation Method.  
4.7 Stepping Stone Method,  
4.8 Multipliers Method,  
4.9 Assignment Problem |
| 14+15+16 | 5.1 Levels of tabulations project.  
5.2 Network Rules & Construction.  
5.3 Network Analysis.  
5.4 Critical Path Method.  
5.5 Program Evaluation and Review Technique |

7. Teaching and learning Strategies and Evaluation Methods:

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Teaching Strategies</th>
<th>Learning Strategies</th>
<th>Evaluation Methods</th>
</tr>
</thead>
</table>
| A1) State the theories and concepts used in linear optimization.  
A2) Apply the simplex method in linear optimization.  
A3) Apply interior point methods in linear optimization. | - Writing on the blackboard  
- Ask students questions and discuss them  
- Solve various issues | Give homework assignments | - Classroom presentations  
- Discussion  
- First exam |
| B1) Apply appropriate theories, principles and concepts relevant to linear optimization.  
B2) Apply appropriate theories, principles and concepts relevant to duality in linear optimization. | - Writing on the blackboard  
- Ask students questions and discuss them  
- Solve various issues | Give homework assignments | - Classroom presentations  
- Discussion  
- Second exam |
| C1) Plan and design applications using techniques and procedures appropriate to the simplex method. | - Writing on the blackboard  
- Ask students questions and discuss them  
- Solve various issues | Give homework assignments | - |
C2) Plan and design applications using techniques and procedures appropriate to interior point methods

D1) Deal with an appropriate effective data relevant to linear optimization.
D2) Solve linear optimization models using ideas and techniques some of which are at the forefront of the discipline.

- Writing on the blackboard
- Ask students questions and discuss them
- Solve various issues
Give homework assignments
- Classroom presentations
- Discussion
- Final exam

8. Text Book:

<table>
<thead>
<tr>
<th>The main reference</th>
<th>Elementary Linear programming with applications</th>
</tr>
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<tbody>
<tr>
<td>Author(s)</td>
<td>Bernard Kolman and Robert E. Beck</td>
</tr>
<tr>
<td>Publisher</td>
<td>Elsevier Science &amp; technology books</td>
</tr>
<tr>
<td>Year</td>
<td>1995</td>
</tr>
<tr>
<td>The edition</td>
<td><a href="https://drive.google.com/file/d/1dRL8HcHfflG98d1wI4G180flIBr-a2UT/view?usp=sharing">https://drive.google.com/file/d/1dRL8HcHfflG98d1wI4G180flIBr-a2UT/view?usp=sharing</a></td>
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9. References and additional resources:
