The University of Jordan

Accreditation & Quality Assurance Center

Course Syllabus

Course Name:
Principles of Optimization
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Course title</td>
<td>Principles of Optimization</td>
</tr>
<tr>
<td>2</td>
<td>Course number</td>
<td>0341271</td>
</tr>
<tr>
<td>3</td>
<td>Credit hours (theory, practical)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Contact hours (theory, practical)</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Prerequisites/corequisites</td>
<td>0301241</td>
</tr>
<tr>
<td>5</td>
<td>Program title</td>
<td>B.Sc. in Mathematics</td>
</tr>
<tr>
<td>6</td>
<td>Program code</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Awarding institution</td>
<td>The University of Jordan</td>
</tr>
<tr>
<td>8</td>
<td>Faculty</td>
<td>Science</td>
</tr>
<tr>
<td>9</td>
<td>Department</td>
<td>Mathematics</td>
</tr>
<tr>
<td>10</td>
<td>Level of course</td>
<td>Bachelor</td>
</tr>
<tr>
<td>11</td>
<td>Year of study and semester (s)</td>
<td>2017/2018</td>
</tr>
<tr>
<td>12</td>
<td>Final Qualification</td>
<td>B.Sc. in Mathematics</td>
</tr>
<tr>
<td>13</td>
<td>Other department (s) involved in teaching the course</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Language of Instruction</td>
<td>English</td>
</tr>
<tr>
<td>15</td>
<td>Date of production/revision</td>
<td>December 10, 2017</td>
</tr>
</tbody>
</table>

**16. Course Coordinator:**

Course coordinator: Dr. Baha Alzalg  
Office number: Mathematics Building 306  
Office hours: T.B.D.  
Phone number: 0096265355000 Ext. 22086  
Email addresses: b.alzalg@ju.edu.jo  
Course website: [http://sites.ju.edu.jo/sites/Alzalg/Pages/271.aspx](http://sites.ju.edu.jo/sites/Alzalg/Pages/271.aspx)

**17. Other instructors:**

*Office numbers, office hours, phone numbers, and email addresses should be listed.*

**18. Course Description:**

Optimization methods and techniques for solving problems in business, engineering, sciences, sports, and several other areas. Introduction to linear optimization, integer linear optimization and network optimization. Model formulation, solution techniques and algorithms, and the use of modeling softwares.
A- Aims:

1. Develop a fundamental understanding of optimization models.
3. Able to develop an (integer) linear optimization model from a problem description.
4. Learn optimization algorithms for solving integer linear programming.
5. Deal with the art in linear optimization.

B- Intended Learning Outcomes (ILOs):

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 discrete optimization.

A2) Recognize the contribution and impacts of operations research in scientifically, economic, environmental and cultural terms.

B. Intellectual skills:

B1) Apply appropriate theories, principles and concepts relevant to discrete optimization.

B2) Demonstrate a reasoned argument to the solution of familiar and unfamiliar problems relevant to discrete optimization.

C. Professional skills:

C1) Plan and design applications using techniques and procedures appropriate to network flow problems.

C2) Plan and design applications using techniques and procedures appropriate to integer linear programming.

D. General skills:

D1) Deal with an appropriate effective data relevant to discrete optimization.

D2) Solve problems relevant to operations research using ideas and techniques some of which are at the forefront of the discipline.

20. Topic Outline and Schedule:

The following is a rough plan. As the course progresses, I may include new topics and/or delete some of the ones listed here.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Achieved ILOs</th>
<th>Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 1. Introduction to linear programming</td>
<td></td>
<td>1-2</td>
</tr>
<tr>
<td>Chapter 7. Network flow problems (7.1- 7.5)</td>
<td></td>
<td>3-7</td>
</tr>
<tr>
<td>Chapter 10. Integer programming formulations</td>
<td></td>
<td>8-9</td>
</tr>
<tr>
<td>Chapter 11. Integer programming methods</td>
<td></td>
<td>10-13</td>
</tr>
<tr>
<td>Chapter 12. The art in linear optimization</td>
<td></td>
<td>14-16</td>
</tr>
</tbody>
</table>
21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

1. The instructor will spend most of the class time on presenting the new material as well as on discussing the new ideas and techniques with the students.
2. To actively participate in class, students need to prepare before class by reading the textbook and doing all assigned problems before class.
3. Students should be prepared to discuss their homework at each class meeting.
4. Students are encouraged to work together with other students and to ask questions and seek help from their professor, both in and out of class.

22. Evaluation Methods and Course Requirements:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

<table>
<thead>
<tr>
<th>ILO/s</th>
<th>Learning Methods</th>
<th>Evaluation Methods</th>
<th>Related ILO/s to the program</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lectures</td>
<td>Exams and Assignments</td>
<td>To develop the necessary skills to do independent and original research</td>
</tr>
</tbody>
</table>

23. Course Policies:

1. Attendance is absolutely essential to succeed in this course. You are expected to attend every class; please notify your instructor if you know you are going to be absent. All exams must be taken at the scheduled time. Exceptions will be made only in extreme circumstances, by prior arrangement with the instructor.
2. If a student is absent for more than 10% of lectures without an excuse of sickness or due to other insurmountable difficulty, then he/she shall be barred from the final examination also he/she will get a failing grade in this course.
3. Medical certificates shall be given to the University Physician to be authorized by him. They should be presented to the Dean of the Faculty within two weeks of the student’s ceasing to attend classes.
4. Test papers shall be returned to students after correction. His/her mark is considered final after a lapse of one week following their return.
5. Solutions for the exams will be posted at the teaching webpage of the instructor.
6. Cheating is prohibited. The University of Jordan regulations on cheating will be applied to any student who cheats in exams or on home works.

24. Required equipment:

Data Show.
25. References:

A- Required book (s), assigned reading and audio-visuals:
   Dimitris Bertsimas and J. Tsitsiklis. Introduction to Linear Optimization. Athena Scientific Series in
   Optimization and Neural Computation.

B- Recommended books, materials, and media:

26. Additional information:

   NA

Date: December 10, 2017

Name of Course Coordinator: Dr. Baha Alzalg.  
Head of curriculum committee/Dept.: Prof. Emad Abuosba.  
Head of Department: Dr. Baha Alzalg.  
Head of curriculum committee/Faculty: Prof. Amal Al-Aboudi.  
Dean: Prof. Sami Mahmoud.

Signature: ------------------------------

Copy to: 
Head of Department
Assistant Dean for Quality Assurance
Course File