DE LA SALLE UNIVERSITY - MANILA  
Mathematics Department  
SYLLABUS

COURSE CODE/TITLE : GRAPTHE (Graph Theory)  
COURSE CREDIT : 3 units  
TYPE OF COURSE : Major Course for Science Students  
FACULTY :  
TERM/TIME/ROOM :  

COURSE DESCRIPTION : An introductory course in graph theoretic concepts which include connectivity, trees, traversability, factorizations, planarity, colorability. Applications in operations research and computer sciences as well as open problems are also discussed.

COURSE OBJECTIVES :  
1. To make students aware that graphs are mathematical models for some real-life situations.  
2. To give the students a knowledge of basic concepts which will enable them to appreciate both the theory and the applications of graph theory.  
3. To demonstrate to the students that many problems – theoretical or real life – can be analyzed and solved using graphs.  
4. To develop the skill of translating problems to graph-theoretic problems and interpreting the solution in terms of the real situation.

VALUE AIMS :  
1. To develop the skill of solving graph-theoretic problems using known results and basic concepts in graph theory.  
2. To encourage interaction and cooperation among students through problem sets assigned to students.  
3. To develop the ability to perform independent analysis and reasoning.

Harary, F., *Graph Theory*, Addison-Wesley, 1961

TEACHING METHODS AND STRATEGIES:  
1. Lecture  
2. Recitation  
3. Individual Seatwork on Problem Solving  
4. Cooperative or Group Learning

ASSESSMENT / EVALUATION:  
Quizzes and Long Exams 70%  
Final Exam 30%  
Passing Grade 60%

GRADING SCALE:  
<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>95-100</td>
<td>4.0</td>
</tr>
<tr>
<td>89-94</td>
<td>3.5</td>
</tr>
<tr>
<td>83-88</td>
<td>3.0</td>
</tr>
<tr>
<td>78-82</td>
<td>2.5</td>
</tr>
<tr>
<td>72-77</td>
<td>2.0</td>
</tr>
<tr>
<td>66-71</td>
<td>1.5</td>
</tr>
<tr>
<td>60-65</td>
<td>1.0</td>
</tr>
<tr>
<td>Below 60</td>
<td>0.0</td>
</tr>
</tbody>
</table>
COURSE OUTLINE

1. DIGRAPHS 9 HRS
   1.1 Directional Concepts and Converse Concepts
   1.2 Digraph Invariants
   1.3 Walk, Path and Circuit
   1.4 Adjacency Matrix
   1.5 Isomorphism and Automorphism

2. MULTIDIGRAPHS 6 HRS
   2.1 Converse of a Digraph / Multidigraph
   2.2 Directional Duality Principle
   2.3 Independent Set, Absorbent Set, Kernel
   QUIZ 1

3. UNDIRECTED GRAPHS 12 HRS
   3.1 Simple Graph, Multigraph
   3.2 Walk, Path and Cycle
   3.3 Connected Graph, Components of a Graph
   3.4 Regular Graphs, Platonic Solids
   3.5 Adjacency Matrix
   3.6 Complement
   3.7 Isomorphism and Automorphism
   QUIZ 2

4. SUBGRAPHS 3 HRS
   4.1 Proper Subgraph
   4.2 Induced Subgraph
   4.3 Spanning Subgraph

5. SOME CLASSES OF GRAPHS 9 HRS
   5.1 Tree
   5.2 Complete Graph, Complete Bipartite Graph
   5.3 Path, Cycle, Wheel
   5.4 Hamiltonian Graphs
   5.5 Eulerian Graphs
   QUIZ 3

6. SOME GRAPH INVARIANTS 3 HRS
   6.1 Independence Number
   6.2 Dominance Number
   6.3 Chromatic Number

FINAL EXAMINATION