Philadelphia University
Faculty of Information Technology
Department of Computer Science
Second Semester, 2007/2008

Course Syllabus	
Course Title: **Design and Analysis of Algorithms**	**Course code: 750322**
Course Level: 3	**Course prerequisite(s) and/or corequisite(s):** **210103 + 721211**
Lecture Time: 11:10-12:00; 11:15-12:45	**Credit hours: 3**

Academic Staff Specifics

Name	**Rank**	**Office Number and Location**	**Office Hours**	**E-mail Address**
Dr. Nadia Y. Yousif	**Associate Professor**	**IT-332**	**(Sun, Tue, Thu)** **13:00-14:00** **(Mon, Wed)** **12:45-13:45**	**nyaaqob@philadelphia.edu.jo**

Course Description:
The module introduces formal techniques to support the design and analysis of algorithms, focusing on both the underlying mathematical theory and practical considerations of efficiency. Topics include asymptotic complexity bounds, techniques of analysis, and algorithmic strategies.

Course Objectives:
The aim of this module is to learn how to develop efficient algorithms for simple computational tasks and reasoning about the correctness of them. Through the complexity measures, different range of behaviors of algorithms and the notion of tractable and intractable problems will be understood.

Course Components

Textbooks:
1) Anany Levitin, Introduction to the Design and Analysis of Algorithms, Pearson Education, 2007

2) Sara Baase, Computer Algorithms: Introduction to Design and Analysis, Third Edition, Addison-Wesley, 2000.

In addition to the above, the students will be provided with handouts by the lecturer.

Teaching Methods:
Duration: 16 weeks, 48 hours in total
Lectures: 38 hours, 2 per week (including two 1-hour midterm exams)
Tutorials: 7 hours, (1 hour per 2 weeks)
Report Presentation: 3 hours
Homework: 3 assignments and one research report

Learning Outcomes:
- **Knowledge and understanding**
  - Understanding basic ideas about algorithms
  - Understanding the concepts of time and space complexity, worst case, average case and best case complexities and the big-O notation
  - Understanding the range of behaviors of algorithms and the notion of tractable and intractable problems
  - Knowing and understanding a wide range of searching and sorting algorithms

- **Cognitive skills (thinking and analysis).**
  - Developing efficient algorithms for simple computational tasks
  - Reasoning about the correctness of algorithms
  - Computing complexity measures of algorithms, including recursive algorithms using recurrence relations

- **Communication skills (personal and academic).**
  - Ability to represent projects.

- **Practical and subject specific skills (Transferable Skills).**

Assessment Instruments

Allocation of Marks	
Assessment Instruments	**Mark**
First examination	**15%**
Second examination	**15%**
Final Exam (written unseen exam)	**40 %**
Final Research Report (defended)	**10%**
Reports, research projects, Quizzes, Home works, Projects	**20%**
Total	**100%**

* Make-up exams will be offered for valid reasons only with consent of the Dean. Make-up exams may be different from regular exams in content and format.

Practical Submissions
The assignments that have work to be assessed will be given to the students in separate documents including the due date and appropriate reading material.

Documentation and Academic Honesty
Submit your home work covered with a sheet containing your name, number, course title and number, and type and number of the home work (e.g. tutorial, assignment, and project).

Any completed homework must be handed in to my office (room IT 332) by 15:00 on the due date. After the deadline "zero" will be awarded. You must keep a duplicate copy of your work because it may be needed while the original is being marked.

You should hand in with your assignments:

1- A printed listing of your test programs (if any).
2- A brief report to explain your findings.
3- Your solution of questions.

For the research report, you are required to write a report similar to a research paper. It should include:

- **Abstract**: It describes the main synopsis of your paper.
- **Introduction**: It provides background information necessary to understand the research and getting readers interested in your subject. The introduction is where you put your problem in context and is likely where the bulk of your sources will appear.
- **Methods (Algorithms and Implementation)**: Describe your methods here. Summarize the algorithms generally, highlight features relevant to your project, and refer readers to your references for further details.
- **Results and Discussion (Benchmarking and Analysis)**: This section is the most important part of your paper. It is here that you demonstrate the work you have accomplished on this project and explain its significance. The quality of your analysis will impact your final grade more than any other component on the paper. You should therefore plan to spend the bulk of your project time not just gathering data, but determining what it ultimately means and deciding how best to showcase these findings.
- **Conclusion**: The conclusion should give your reader the points to "take home" from your paper. It should state clearly what your results demonstrate about the problem you were tackling in the paper. It should also generalize your findings, putting them into a useful context that can be built upon. All generalizations should be supported by your data, however; the discussion should prove these points, so that when the reader gets to the conclusion, the statements are logical and seem self-evident.
- **Bibliography:** Refer to any reference that you used in your assignment. Citations in the body of the paper should refer to a bibliography at the end of the paper.

- **Protection by Copyright**
1. Coursework, laboratory exercises, reports, and essays submitted for assessment must be your own work, unless in the case of group projects a joint effort is expected and is indicated as such.
2. Use of quotations or data from the work of others is entirely acceptable, and is often very valuable provided that the source of the quotation or data is given. Failure to provide a source or put quotation marks around material that is taken from elsewhere gives the appearance that the comments are ostensibly your own. When quoting word-for-word from the work of another person quotation marks or indenting (setting the quotation in from the margin) must be used and the source of the quoted material must be acknowledged.
3. Sources of quotations used should be listed in full in a bibliography at the end of your piece of work.

- **Avoiding Plagiarism**.
1. Unacknowledged direct copying from the work of another person, or the close paraphrasing of somebody else's work, is called plagiarism and is a serious offence, equated with cheating in examinations. This applies to copying both from other students' work and from published sources such as books, reports or journal articles.
2. Paraphrasing, when the original statement is still identifiable and has no acknowledgement, is plagiarism. A close paraphrase of another person's work must have an acknowledgement to the source. It is not acceptable for you to put together unacknowledged passages from the same or from different sources linking these together with a few words or sentences of your own and changing a few words from the original text: this is regarded as over-dependence on other sources, which is a form of plagiarism.
3. Direct quotations from an earlier piece of your own work, if not attributed, suggest that your work is original, when in fact it is not. The direct copying of one's own writings qualifies as plagiarism if the fact that the work has been or is to be presented elsewhere is not acknowledged.

4. Plagiarism is a serious offence and will always result in imposition of a penalty. In deciding upon the penalty the Department will take into account factors such as the year of study, the extent and proportion of the work that has been plagiarized, and the apparent intent of the student. The penalties that can be imposed range from a minimum of a zero mark for the work (without allowing resubmission) through caution to disciplinary measures (such as suspension or expulsion).

Course/Module Academic Calendar

Week	Basic and support material to be covered	Homework/reports and their due dates
(1)	Introduction, Algorithm definition, Algorithm Analysis	
(2)	Mathematical Induction	
(3)	Summation Techniques, **Tutorial 1**	
(4)	Recurrence Relations,	**Assignment 1** **Due Date: 23/3/2008**
(5)	Design & Analysis of Algorithms: Divide and Conquer, **Tutorial 2**	
(6)	Divide and Conquer	
(7) **First Exam**	Greedy Algorithm, **Tutorial 3**	**Assignment 2** **Due Date: 15/4/2008**
(8)	Greedy Algorithm	
(9)	Dynamic Programming, **Tutorial 4**	
(10)	Dynamic Programming	**Assignment 3** **Due Date: 4/5/2008**
(11)	Backtracking, **Tutorial 5**	
(12)	Branch-Bound, **Tutorial 6**	**Research report** **Due Date: 1/6/2008**
(13) **Second Exam**	Lower Bound Theory, Sorting and Searching,	
(14)	NP-Complete Problems: Basic Concepts, **Tutorial 7**	
(15) **Specimen examination (Optional)**	NP-Hard & NP-Complete Problem,	
(16) **Final Examination**	Presentation of the research report	

Expected workload:
On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

Attendance policy:
Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Module References
Students will be expected to give the same attention to these references as given to the Module textbook(s)

1) E. Horowitz, et.al., Fundamentals of Computer Algorithms, Galgotia Publications, 1998.
2) Udi Manber, Introduction to Algorithms: a Creative Approach, Addison-Wesley, 1997.
3) T. Cormen, et.al., Introduction to Algorithms, 1999.
4) R. Sedgewick, Algorithms in C++, 2002.