**Menoufiya University**

**Faculty of Computers and Information**

**Department of  Computer Science**

جامعة المنوفية

كلية الحاسبات والمعلومات

قسم علوم الحاسب

# COURSE SPECIFICATIONS

## (STATISTICAL METHODS)

**Programme(s) on which the course is given**     CS, IT, IS and OR

**Major or Minor element of programs**     Major

**Department offering the program**     Computer Science

**Department offering the course**     Information Technology

**Academic year / Level**     $2^{nd}$  Year / $2^{nd}$ Semester

9/5/2007

## A- Basic Information

| Title | Statistical Methods | | Code | ST221 | |
|---|---|---|---|---|---|
| Credit Hours | Lecture | 3 | Tutorial | 3 | Practical | - |
| | Total | | | 6 | |

## B- Professional Information

### 1-  Overall aims of course

- Understand apply the principles of methods used to analyze and interpret data
- Understand and apply the methods of parameter estimation and testing hypothesis about these parameters
- Understand the principles of testing the goodness of fit.
- Understand and apply the principles of calculating and testing multiple regressions.
- Understand and apply the principles of random variables and how to calculate their parameters

### 2-  Intended learning outcomes of course (ILOs)

#### a- Knowledge and understanding

**a1**  Know and understand the essential mathematics relevant to computer science.

**a4**  Know and understand the fundamental concepts, principles and theories of computing and computer science covering topics such as algorithms, operating system, programming languages and artificial intelligence.

#### b- Intellectual skills

**b1** Solve a wide range of problems related to the analysis, design and construction of computer systems

**c- Professional and practical skills**

**d- General and transferable skills**

**d6** Employ discrete mathematical skills as appropriate.

## 3- Contents

| Topic | No. of Hours | Lecture | Tutorial / Practical |
|---|---|---|---|
| **1 Estimation**<br>• Introduction<br>• Estimation of a population mean: Large-sample case<br>• Estimation of a population mean: small sample case<br>• Estimation of a population proportion<br>• Estimation of the difference between two population means: Independent samples<br>• Estimation of the difference between two population means: Matched pairs<br>• Estimation of the difference between two population proportions<br>• Choosing the sample size<br>• Estimation of a population variance<br>• Exercises | 18 | 9 | 9 |
| **2 Nonparametric statistics**<br>• Introduction<br>• The sign test for a single population<br>• Comparing two populations based on independent random samples: Wilcoxon rank sum test<br>• Comparing two populations based on matched pairs: the Wilcoxon signed ranks test<br>• Rank Correlation: Spearman's rs statistic<br>• Exercises | 12 | 6 | 6 |
| **3 Applications of Hypothesis Testing**<br>• Introduction<br>• Hypothesis test about a population mean<br>• Hypothesis tests of population proportions<br>• Hypothesis tests about the difference between two population means<br>• Hypothesis tests about the difference between two proportions<br>• Hypothesis test about a population variance<br>• Hypothesis test about the ratio of two population variances<br>• Exercises | 12 | 6 | 6 |
| **4 Categorical data analysis and analysis of variance**<br>• Introduction<br>• Tests of goodness of fit | 12 | 6 | 6 |

| | | 84 | 42 | 42 |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| | • The analysis of contingency tables<br>• Contingency tables in statistical software packages<br>• Design of experiments<br>• Completely randomized designs<br>• Randomized block designs<br>• Multiple comparisons of means and confidence regions<br>• Exercises | | | |
| **5** | **Multiple regression**<br><br>• Introduction: the general linear model<br>• Model assumptions<br>• Fitting the model: the method of least squares<br>• Estimating $\sigma 2$<br>• Estimating and testing hypotheses about the B parameters<br>• Checking the utility of a model<br>• Using the model for estimating and prediction<br>• Multiple linear regression: An overview example<br>• Model building: interaction models<br>• Model building: quadratic models<br>• Exercises | 18 | 9 | 9 |
| **6** | **Random Variables**<br><br>• Continuous Random Variables and Histograms<br>• Probability Density Functions: Uniform, Exponential, and Normal.<br>• Mean, Median, Variance, and Standard Deviation | 12 | 6 | 6 |
| **7** | **APPENDIX: TABLES**<br><br>• Area of the Standard Normal Distribution<br>• $\chi$ -Distribution,<br>• t-Distribution, and<br>• F-Distribution | | | |
| **Total number of Hours for the course** | | **84** | **42** | **42** |

## 4- Teaching and learning methods

**4.1** Research assignment
**4.2** Lecture
**4.3** Class activities
**4.4** Sections.

## 5- Student assessment methods

### 5-a Methods

**5.a.1** Class test (1) ……. *to assess* …Understanding...
**5.a.2** Class test (2) ……. *to assess* …Understanding...
**5.a.3** Reports ……… …. *to assess* Problem Solving
**5.a.4** Mid term exam … *to assess* gains of completed topics….

### 5-b Assessment schedule

| Assessment 1 | 5$^{th}$ week. |
|---|---|
| Assessment 2 | 8$^{th}$ week. |
| Assessment 3 | 10$^{th}$ week. |
| Assessment 4 | 17$^{th}$ -18$^{th}$ weeks *(final written exam* |

### 5-c Weighting of assessments

| Final-term examination | 70% |
|---|---|
| Mid-term examination | 20% |
| Semester work | 10% |
| Other types of assessment | - |
| Total | 100% |

## 6- List of references

### 6-a Course notes

There are lectures notes prepared in the form of a book authorized by the department

### 6-b Essential books (text books)

None

### 6-c Recommended books

None

### 6-d Periodicals, Web sites, … etc

None

## 7- Facilities required for teaching and learning

- Software program.
- White board and colored pens.
- Datashow, screen, and laptop computer.

**Course coordinator:**

**Prof. Mohiy M. Hadhoud**

**Head of Department:**

**Prof. Mohiy M. Hadhoud**

**Date:  /  /**