**Course Specification**

**(**IT 412 Real Time Systems**)**

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| **University:** | Helwan University |
| **Faculty:** | Faculty of Computers & Information |
| **Department:** | Information Technology |

**1. Course Data**

|  |  |
| --- | --- |
| **Code:** | **IT 412** |
| **Course title:** | Real Time Systems |
| **Level:** | 4 |
| **Specialization:** | Information Technology |
| **Credit hours:** |  |
| **Number of learning units (hours):** | ( 3) theoretical () practical (2)Tutorial |

**2. Course Objective**

* Introducing concepts and techniques applied to the performance evaluation of computer systems and which are based on measurement, analytical modeling and simulation.
* Presenting probability distributions in relation to computer systems performance evaluation along with other fundamental concepts such as events, uncertainty and intervals.
* Studying the resource contention problem with mathematical modeling of the resulting queuing situation as well as showing the effect of scheduling algorithms on performance.
* Acquainting students with user-oriented and system-oriented performance metrics.
* Presenting different types of workloads.
* Updating students with performance monitoring techniques.

**3. Intended Learning Outcomes:**

1. **Knowledge and Understanding**

A1. Identify fundamentals of Operating Systems.

A7. Describe Engineering process of Software Production.

A12. Describe human-computer interface.

1. **Intellectual Skills**

B18. Perform Creative Thinking.

B21. Formulate the foundations and the theories behind building IT systems.

B23. Formulate and implement IT systems.

1. **Professional and Practical Skills**

C2. Evaluate IT systems.

C15. Construct Time management techniques.

C23. Use of Programming skills.

1. **General and Transferable Skills**

D13. Use Designing skills to solve problems effectively.

D14. Support Engineering skills.

**4. Course contents**

|  |  |  |  |
| --- | --- | --- | --- |
| **Topic** | **No. of hours** | **Lecture** | **Tutorial/ Practical** |
| Introduction  Overview  Evolution of computer systems architectures  Overview of CPU architectures  Evolution of database systems  Evolution of operating systems  Evolution of computer networks  Need for performance evaluation  Overview of performance evaluation methods  Models  Modeling Tools | 6 | 2 | 2 |
| Fundamental Concepts  System-Oriented Measures  User-Oriented Measures  Time  Events  Measurements  Intervals  Response  Independence  Randomness  Workloads | 6 | 2 | 2 |
| Statistical background in relation to Performance Evaluation  Probability distributions with examples on computer systems performance evaluation | 6 | 2 | 2 |
| Resource Contention and Performance Measures  Factors affecting a queuing situation  Request arrival characteristics  Service requirements  Departure characteristics  Service Capacity  Traffic Intensity  Stability  Saturation  Throughput  Utilization | 9 | 3 | 3 |
| Scheduling Algorithms  Workload Modeling  Types of Workloads  Benchmarks  Synthetic Jobs  Kernels  Scripts  Instruction Mixes  Measuring Computing Power (Knight’s Equation) | 9 | 3 | 3 |
| Performance Measurement and Monitoring  Hardware Monitors  Software Monitors  Firmware Monitors  Presentation of Results | 9 | 3 | 3 |

**3.1** **Mapping contents to ILOs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Topic | Intended Learning Outcomes (ILOs) | | | |
| Knowledge and understanding | Intellectual Skills | Professional and practical skills | General and Transferable skills |
| Introduction | A1 |  |  |  |
| Fundamental Concepts | A1 |  |  |  |
| Statistical background in relation to Performance Evaluation | A1 | B18 | C2 |  |
| Resource Contention and Performance Measures | A1 | B21 |  |  |
| Scheduling Algorithms | A1 |  | C15, C23 |  |
| Performance Measurement and Monitoring | A7, A12 | B18, B23 | C2 | D13,D14 |

**5. Teaching and Learning Methods**

-Lectures

- Exercises

- Presenting case studies.

**6. Teaching and Learning Methods for students with limited capability**

* Using data show
* e-learning management tools

**7. Students Evaluation**

1. **Used Methods**

-Written exams.

- Semester work and Assignments

1. **Time**

Assessment 1 Midterm Exam Week 8

Assessment 2 Assignments

Assessment 3 Final Written Exam Week 15

1. **Grades Distribution**

Written examinations 90% (70% for Final and 20% for

midterm)

Semester Work & Assignments 10%

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Total 100 %

Any formative only assessments

**List of Books and References**

**a) Notes**

* Course Notes

**b) Mandatory Books**

- Paul J. Fortier, Howard E. Michel ,Computer Systems Performance Evaluation and Prediction , Elsevier Science, 2003.

- Clement H.C. Leung, Quantitative Analysis of Computer Systems, Clement H.C. Leung.

**c) Suggested Books**

- Krishna Kant, Introduction to Computer System Performance Evaluation, McGraw Hill, 1992.

**d) Other publications**

- Periodicals, Web Sites … etc

**Course Coordinator: Dr. Amal Aboutabl**

**Chairman of the Department: Prof. Dr.**