**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**

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| --- | --- |
| **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** |
| IntroductionOverviewEvolution of computer systems architecturesOverview of CPU architecturesEvolution of database systems Evolution of operating systemsEvolution of computer networks Need for performance evaluation Overview of performance evaluation methods ModelsModeling Tools | 6 | 2 | 2 |
| Fundamental Concepts System-Oriented MeasuresUser-Oriented MeasuresTimeEventsMeasurementsIntervalsResponseIndependenceRandomnessWorkloads | 6 | 2 | 2 |
| Statistical background in relation to Performance EvaluationProbability distributions with examples on computer systems performance evaluation | 6 | 2 | 2 |
| Resource Contention and Performance MeasuresFactors affecting a queuing situationRequest arrival characteristicsService requirementsDeparture characteristicsService CapacityTraffic IntensityStability SaturationThroughputUtilization | 9 | 3 | 3 |
| Scheduling AlgorithmsWorkload ModelingTypes of WorkloadsBenchmarksSynthetic JobsKernelsScriptsInstruction MixesMeasuring Computing Power (Knight’s Equation) | 9 | 3 | 3 |
| Performance Measurement and MonitoringHardware MonitorsSoftware MonitorsFirmware MonitorsPresentation 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.**