### Course Code
ISYS528

### Course Title
Petri nets

### Academic Year
2010-2011

### Academic Term
FALL

### Course Credit
(3, 0) 3

### Instructor(s)
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### Assistant(s)

### Course Objectives
It is the purpose of this course to provide a coherent description of the theoretical and practical aspects of Petri Nets by showing how Petri Nets have been developed – from being a promising theoretical model to being a full-fledged language for the design, specification, simulation, validation and implementation of large discrete event systems.

### Weekly Schedule

1. **BASIC CONCEPTS**: Petri net formalism, places, transitions, input/output arcs, state of a Petri net, enabled and disabled transitions, firing action, reachable marking.
2. **BASIC CONCEPTS**: Behavioral properties including reachability, boundedness, security, limitation, liveness, deadlock, reversibility and safety.
3. **BASIC CONCEPTS**: Structural properties including liveness, boundedness, conservativeness, repetitiveness, consistency and controllability.
4. **ANALYSIS OF PETRI NETS**: Analysis of qualitative and quantitative properties including reachability tree, coverability tree methods.
5. **ANALYSIS OF PETRI NETS**: The method of matrix invariants.
6. **HIGH LEVEL PETRI NETS**: Classification of Petri nets, colored Petri nets, hierarchical Petri nets, timed Petri nets, stochastic Petri nets, etc.
7. 1st term week.
8. **HIGH LEVEL PETRI NETS**: Introduction to colored and hierarchical Petri nets.
9. **COMPUTER TOOLS**: Getting started with CPNTools and Design/CPN software, CPN ML syntax and net inscriptions in CPN ML.
10. **COMPUTER TOOLS**: Editing of CP-nets, simulation of CP-nets, computer tools for formal analysis, occurrence graphs.
11. **COMPUTER TOOLS**: Examples of CP-nets introducing Dining Philosophers, Ring Protocol.
12. **APPLICATIONS OF PETRI NETS**: Example of CP-nets introducing Interconnection Networks and Telephones.
13. **APPLICATIONS OF PETRI NETS**: Examples of CP-nets introducing Distributed Database, and Recourse Allocation.

### Textbook(s) / Required Reading

### Recommended Reading
| Grading Criteria                  | 1st midterm exam – 40%  
|                                  | Quiz – 10%              
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<th>Final exam – 50%</th>
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<td>Academic Honesty</td>
<td>Individual accountability for all individual work, written or oral. Copying from others or providing answers or information, written or oral, to others is cheating. Providing proper acknowledgment of original author. Copying from another student’s paper or from another text without written acknowledgement is plagiarism. According to University’s bylaws cheating and plagiarism are serious offences resulting in a failure from exam or project and disciplinary action (which includes an official warning may appear in student’s transcript or/and suspension from University for up to one semester).</td>
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| Additional Remarks               | • Attendance is compulsory. A student not attended exams and 50% of the classes will receive NG grade.  
|                                  | • Students are strongly encouraged to attend exams on exam date. One general make-up exam will be given at the end of the semester after the finals. Any student not attended exam on time and provided reasonable excuse within three days following the exam will be able to attend make-up exam. |