

EASTERN MEDITERRANEAN UNIVERSITY
COURSE OUTLINE

COURSE CODE	COMP334	COURSE LEVEL	Undergraduate FALL 2019-2020
COURSE TITLE	Modelling with Petri nets		
COURSE TYPE	Area Elective for the Mathematics Department		
LECTURER(S)	Prof.Dr.Rza Bashirov rza.bashirov@emu.edu.tr ext.1005 room AS141		
ASSISTANT(S)			
CREDIT VALUE	(3,0,0) 3	ECTS VALUE	6
PREREQUISITES	None		
COREQUISITES	None		
DURATION OF COURSE	One semester		
WEB LINK	http://opencourses.emu.edu.tr/course/view.php?id=483		

CATALOGUE DESCRIPTION

Petri net formalism, places, transitions, input/output arcs, states, enabled and disabled transitions, firing rule, reachable markings. Behavioural and structural properties. Modelling finite state machines, problem of dining philosophers, producer-consumer problem, synchronization control, communication protocol, parallel activities, pipeline computers. Analysis with reachability and coverability trees, state equation and decomposition method. High level Petri nets introducing coloured Petri nets and hierarchical Petri nets. Process modelling using CPNTools software. Case studies including interconnection networks, resource allocation, telephones and distributed database.

AIMS & 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.

GENERAL LEARNING OUTCOMES (COMPETENCES)

On completion of this module, student should be able to:

- represent a Petri net graphically based on its description and vice versa
- perform heuristic analysis of behavioral and structural properties
- use reachability and coverability tree methods to decide on the Petri net properties
- use state equation to decide on reachability of a marking
- model discrete event systems arising in scientific and engineering domains with regular Petri nets
- represent large regular Petri net in a compact form using coloured Petri nets
- represent regular Petri net in multilayered form using hierarchical Petri nets
- use CPNTools software for problem modelling

On successful completion of this course, all students will have developed their skills in:

- logical and critical thinking
- problem identification and formulation
- modelling of discrete event systems with Petri nets

On successful completion of this course, all students will have developed their appreciation of and respect for values and attitudes regarding the issues of:

- The awareness on how to create different engineering models and use them for problem solving exploring Petri net techniques and mechanisms

GRADING CRITERIA

A (excellent)	A:85-100, A-:80-84 Excellent understanding of the concepts and the principles as demonstrated by correct and accurate knowledge and application of theory/laws in solving problems. Response to problems is clear, legible, concise and accurate. Excellent performance.
B (good)	B+: 75-79, B:70-74 , B-: 66-69 Better than average understanding of the concepts and the principles as demonstrated by correct and accurate knowledge and application of theory/laws in solving problems, but doesn't have the depth and outstanding quality of an "A". Response to problems is fairly clear, legible, but occasionally contains some inaccuracies. Performance exceeds the minimum requirements
C (average)	C+:63-65 , C:55-59 , C-: 56-58 An average understanding of the concepts and the principles as demonstrated by reasonably correct knowledge and application of theory/laws in solving problems, but doesn't have any depth. Response to problems is reasonably clear, legible, but contains inaccuracies. It reveals a sufficient understanding of the material, but lacks depth in understanding and approach/application. Content and form don't go beyond basic expectations and/or display some substantial errors. Acceptable but non-exceptional performance that doesn't go beyond the minimum requirements.
D (barely sufficient)	D+:53-55 , D:50-52 Minimal knowledge and barely sufficient understanding of the concepts and the principles as demonstrated by approximately correct application of theory/laws in solving problems. Response to problems is not very clear and is barely legible, and contains many inaccuracies. It reveals a minimum (confused) understanding of the material, and lacks depth in understanding and approach/application. Content and form do not adequately meet the basic expectations, and/or display significant errors. Performance demonstrates severe problems in one or more areas.
D- (fail)	35-49 Unsatisfactory progress in understanding of the concept and principles, unsatisfactory knowledge of the theoretical part of and insufficient skills in solving problems.
F (fail)	Work does not meet the most minimal standards. It reveals no understanding of the material, lack of basic academic skills and knowledge, or completely incomprehensible writing. Performance is not acceptable
NG	May be given the students not attending classes and or examinations (see important notice 8)

Notice: Grade ranges can be modified to include achievement at that students' actual learning level as compared to the grade level.

RELATIONSHIP WITH OTHER COURSES

This course is self-contained, but it is supposed that the students have minimal knowledge in programming and discrete mathematics.

LEARNING / TEACHING METHOD

The teaching method adopted for this course consists of three lecture hours. The course is conducted using web page.

METHOD OF ASSESSMENT

Course grade will be computed as follows:

1. Midterm Exam %35
2. Homework %20
3. Final Exam %45

IMPORTANT NOTICES

1. Students are strongly encouraged to attend all exams on exam dates as scheduled. If a student misses exam for an authorized reason (hospitalization, death in the family, major illness, representation of the university in sports competitions and other events, etc.) he/she needs to provide an excuse document (a doctor's medical report, circular issued by a vice rector, etc.) to the course instructor to get permission to sit in make-up exam. This should be done within three days following the examination he/she missed.
2. No make-up exams will be given to offset a poor exam grade.
3. Students' attendance is effective predictor of academic achievement. Students are strongly encouraged to attend all the classes. However, students must know that neither extra point will be given for good attendance nor a point will be cut for poor attendance.
4. In the exams students must confirm their identity by providing student ID card or passport. Students who are unable to provide an ID card will not be allowed to attend the examination.
5. Students need to attend the examinations in the rooms they are allocated to. No student will be allowed to attend the examination in a room other than he/she is allocated to.
6. Students may check their examination papers during specified day and period, which will be announced by the instructor of the course.
7. One general make up examination will be given at the end of the semester after the final examination period. Students attending make-up examination will be responsible for all subjects.
8. In accordance with the decision of the Faculty Board of the Faculty of Arts and Sciences, dated September 18, 2019 and numbered 19/23-1, the minimum conditions for the NG grade are determined as follows:
 - Low rate of the student participation (below 50%) in the classes including lectures and tutorial hours, or low rate of the student participation (below 50%) in the weighted grade assessments (examinations and quizzes);
 - Low rate of the student participation (below 50%) in laboratory hours (valid for the courses involving laboratory hours).

TEXTBOOKS

1. James Peterson. Petri Net Theory and Modelling of Systems, Prentice-Hall.
2. Kurt Jensen. Coloured Petri Nets. Basic Concepts, Analysis Methods and Practical Use, Vol 1-3, Springer Verlag.

EXTENDED READING LIST

NONE

SEMESTER OFFERED

2019-2020 Fall Semester

TIME-TABLE

Period	Monday	Tuesday	Wednesday	Thursday	Friday
08:30-09:20	COMP334/MATLIB1				
09:30-10:20	COMP334/MATLIB1				
10:30-11:20					
11:30-12:20					
12:30-13:20					

13:30-14:20					
14:30-15:20				COMP334/MATLIB1	
15:30-16:20					

CONTENT & SCHEDULE

Week	Date	Topics
1	23 – 27 Sep	Formal introduction to Petri nets
2	30 Sep – 4 Oct	Behavioural properties of Petri nets
3	7 Oct – 11 Oct	Structural properties of Petri nets
4	14 Oct – 18 Oct	Modelling finite state machines, five dining philosophers and producer-consumer problems
5	21 Oct – 25 Oct	Modelling producer-consumer problem with priority, synchronization control and communication protocols
6	28 Oct – 1 Nov	Modelling parallel activities and architecture of pipeline computers
7	4 Nov – 8 Nov	Analysis with reachability and coverability trees/graphs
8	11 – 23 Nov	Midterm examinations
9	25– 29 Nov	Analysis with state equations. High level Petri nets: getting started with coloured Petri nets
10	2 – 6 Dec	Case study of resource allocation. High level Petri nets: hierarchical Petri nets
11	9 – 13 Dec	Practical training in CPNTools software
12	16 – 20 Dec	Presentation of homeworks
13	23 – 27 Dec	Presentation of homeworks
14	30 Dec	Last day of the classes
	2 – 17 Jan	Final examinations

Special days:

29 October is a National Holiday (TR Republic Day), a non-working day in Turkey and TRNC.

8 November is a Religious Holiday (Mawlid Celebration), a non-working day in TRNC.

15 November is a National Holiday (TRNC Republic Day), a non-working day in TRNC.

25 December is Christmas Day, a working day in TRNC, but neither attendance will be taken nor examinations will be conducted in the classes.

CHEATING AND PLAGIARISM

1. In accordance with Article 6 – c – vii of the Regulations for Student Disciplinary Code, a short term suspension is imposed for attempting to cheat or to help others cheat in any examination.
2. In accordance with Article 6 – e – i of the Regulations for Student Disciplinary Code, a long term suspension is imposed for cheating or helping others cheat in any examination or project.
3. In accordance with Article 6 – e – xi of the Regulations for Student Disciplinary Code, a long term suspension is imposed for having someone else sit for the exam for oneself or sitting for an exam for the place of someone else.