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| ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ | HELLENIC REPUBLIC |
| **Α .Δ Ι .Π .** | **Η .Q .Α .** |
| ΑΡΧΗ ΔΙΑΣΦΑΛΙΣΗΣ & ΠΙΣΤΟΠΟΙΗΣΗΣ | HELLENIC QUALITY ASSURANCE |
| ΤΗΣ ΠΟΙΟΤΗΤΑΣ ΣΤΗΝ ΑΝΩΤΑΤΗ ΕΚΠΑΙΔΕΥΣΗ | AND ACCREDITATION AGENCY |

**ΤΕΧΝΟΛΟΓΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΙΔΡΥΜΑ ΑΝΑΤΟΛΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ ΚΑΙ ΘΡΑΚΗΣ**

ΜΟΝΑΔΑ ΔΙΑΣΦΑΛΙΣΗΣ ΤΗΣ ΠΟΙΟΤΗΤΑΣ ΤΕΙ ΑΜΘ

# Quality Assurance in Higher Education
# **Course Data Collection Form**


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| **ΤΕΧΝΟΛΟΓΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΙΔΡΥΜΑ ΑΝΑΤΟΛΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ & ΘΡΑΚΗΣ** | **EASTERN MACEDONIA AND THRACE INSTITUTE OF TECHNOLOGY** |
| **ΑΓΙΟΣ ΛΟΥΚΑΣ,** | **AGIOS LOUKAS** |
| **65404 ΚΑΒΑΛΑ** | **65404 KAVALA** |

# COURSE OUTLINE

## 1. GENERAL

| | | | |
|---|---|---|---|
| **Name and surname of lecturer** | Panagiotis Kogias | | |
| **SCHOOL** | of Technological Applications | | |
| **ACADEMIC UNIT** | Department of Electrical Engineering | | |
| **LEVEL OF STUDIES** | Undergraduate | | |
| **COURSE CODE** | DN3 | **SEMESTER** | 4° |
| **COURSE TITLE** | **AUTOMATIC CONTROL SYSTEM** | | |

| **INDEPENDENT TEACHING ACTIVITIES** *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits* | **WEEKLY TEACHING HOURS** | **CREDITS** |
|---|---|---|
| Lectures and Laboratory | 3th+2lab | 5,5 |
| | | |
| | | |
| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).* | | |

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| **COURSE TYPE** *general background, special background, specialised general knowledge, skills development* | background<br>Skills development |
| **PREREQUISITE COURSES:** | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | NO |
| **COURSE WEBSITE (URL)** | http://eclass.teikav.edu.gr/ED208/ |

## 2. LEARNING OUTCOMES

**Learning outcomes**

*The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.*

*Consult Appendix A*

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

*The aim of the course is to understand basic concepts of the theory of Automatic Control Systems. Familiarity with the concepts of analog simulation, mathematical modeling and the dynamic behavior of systems, both in time and in terms of frequency. The study of the behavior and stability of closed automatic control systems. Familiarity with the problem of the composition of such systems by various methods. The introduction to the theory of the internal condition of the systems. The introduction to the realization of independent automatic control systems with microcontrollers.*

*Upon successful completion of the course students will be able to:*

*• describe an analog system with the mathematical model of the transfer function*

*• studying the behavior, its response, its stability, its performance using the Laplace transform and Geometric place of roots*

*• To be able to convert an analog to digital using SAE transformation z and studying the behavior, as in the case of the analog*

*• be able to make and illustrate the harmonic analysis of an analog (Automatic Control System) SAE on charts BODE, NICHOLS (BLACK) and NYQUIST*

*• based on the diagrams to study the behavior characteristic variables, stability and system performance*

*• Be able to use microcontrollers to implement automation systems.*

**General Competences**

*Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?*

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|---|---|
| *Search for, analysis and synthesis of data and information, with the use of the necessary technology* | *Project planning and management* |
| *Adapting to new situations* | *Respect for difference and multiculturalism* |
| *Decision-making* | *Respect for the natural environment* |
| *Working independently* | *Showing social, professional and ethical responsibility and sensitivity to gender issues* |
| *Team work* | *Criticism and self-criticism* |
| *Working in an international environment* | *Production of free, creative and inductive thinking* |
| *Working in an interdisciplinary environment* | *……* |
| *Production of new research ideas* | *Others…* |

- Search, analysis and synthesis of data and information, the use and the necessary technologies
- Autonomous Work
- Teamwork
- Design and Project Management
- Generate new research ideas

## 3. SYLLABUS

I. Basic concepts, stages diagrams, signal flow symbols, summing point polarity change removal

and junction point.

II. Steps of an automatic control system, static characteristic, the problem of linearization.

III. Description levels, excitation functions, harmonic response, rules simplification of block diagrams, analog tier, tier with analog behavior and delay 1st order, step by totalitarian behavior.

IV. Controllers, classify controllers, proportional-integral-derivative controller, combining dual controllers, controller PID.

V. Final control, inverter DC / DC chopper, proportional valves, stepper motors.

VI. Sensors (approach, temperature, pressure, flow, angle, etc.).

VII. Closed loop systems behavior study, fixed setpoint - late 1st order with proportional and integral controller.

VIII. Evaluation of an automatic control system, optimal control, parameter selection criteria controller setting criterion Ziegler, Nichols, criterion CHR.

IX. Mathematical modeling systems. Transformation Laplace, and transfer functions.

X. Features sizes and performance closed-loop systems with emphasis on 1st and 2nd order systems.

XI. Stability analysis Routh - Hurwitz.

XII. Root locus method (LTP).

XIII. Automatic control with microcontrollers.

## 4. TEACHING and LEARNING METHODS - EVALUATION

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| **DELIVERY**<br>*Face-to-face, Distance learning, etc.* | Face to face (in the classroom) |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY**<br>*Use of ICT in teaching, laboratory education, communication with students* | |
| **TEACHING METHODS**<br><br>*The manner and methods of teaching are described in detail.*<br><br>*Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.*<br><br>*The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS* | |

| ***Activity*** | ***Semester workload*** |
|---|---|
| Lectures | 39 |
| | |
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| laboratory Exercises | 39 |
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| independent Study | 59,5 |
| ***Total Course (25 hours workload per credit unit)*** | 137,5 |

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| **STUDENT PERFORMANCE EVALUATION**<br><br>*Description of the evaluation procedure*<br><br>*Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other*<br><br>*Specifically-defined evaluation criteria are given, and if and where they are accessible to students.* | Theory<br>Final written examination (100%) which includes solving problems from different sections of the course.<br><br>Laboratory Course<br>I. Individual work (30%)<br>II. Final Exam (70%) with multiple choice questions throughout the course material. |

## 5. ATTACHED BIBLIOGRAPHY

*- Suggested bibliography:*

*- Related academic journals:*


• I.Lignos, G.Politis, P.Mpouslis, G.Chamilothoris, Automation and automated control systems (b issue).
• R. Dorf, R. Bishop, Modern Automatic Control Systems, 11th edition Tziolas. 2010.
• P. B. Malatestas, Automatic Control Systems, Ed. Tziola, 2013.
• GF Franklin and al, Feedback control of Dynamic Systems, 5 th ed., Pearson Prentice Hall, 2006
• W. N. Paraskevopoulos, Introduction to Automatic Control. Volume A Theory, Athens 2001.
• C. E. Rohrs, J.L. Melsa and D.G. Shultz, Linear Automatic Control Systems, Ed. Tziola, 1996.