### DP in Electrical and Automation Engineering (BEEANU15A7)

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**BEEAN15AYDIN-1000 Ydinosaaminen: 174 op**

**BEEAN15AEA01-1000 Technology project: 16.5 op**

**Osaamistavoitteen**
The student is reliable, responsible, and works independently in his or her own studies and when functioning as a member of a group. He or she knows how to utilise mathematics and the basic tools of data technology. He or she is familiar with the typical tasks of the field and the career possibilities.

The student functions independently and responsibly in the HAMK learning environment, both in his or her own studies, and as a member of a group, knows how to communicate purposefully as a student and a member of the working community both face-to-face and on line, is capable of utilising the basic tools of information technology in solving problems in the field, is capable of utilising the basic tools of mathematics in solving problems, is familiar with the job description of an automation engineer and with the most common applications of automation

**EA0101 Tools of information technology and study skills: 4 op**

**Sisältö**
This theme is a part of the module Technology Project.

**EA0102 Basic tools of mathematics: 4 op**

**Sisältö**
This theme is a part of the module Technology Project.

**EA0103 Working English: 1.5 op**

**Sisältö**
This theme is a part of the module Technology Project.
EA0104 Communications: 1.5 op
Sisältö
This theme is a part of the module Technology Project.

EA0105 Basics of Practical Finnish: 1.5 op
Sisältö
This theme is a part of the module Technology Project.

EA0106 Technology study project: 4 op
Sisältö
This theme is a part of the module Technology Project.

BEEAN15AEA02-1000 Automation engineering: 16.5 op
Osaamistavoitteet
The student is familiar with and is capable of applying automation technology in its typical applications. He or she is capable of applying electronics in automation engineering. He or she is capable of communication on the use of information technology in automation engineering.

The student knows the basic solutions of automation engineering and the tools for their planning, and knows how to apply them in the practices in the field, is capable of communicating in foreign languages both orally and in writing in the working community of his or her own field, is familiar with the basics of electronics and digital technology and knows the areas of their use and their methods of application in the implementations of equipment applications.

EA0201 The fundamentals of automation engineering and their practical applications: 7.5 op
Sisältö
This theme is a part of the module Automation Engineering.

EA0202 Communications: 1.5 op
Sisältö
This theme is a part of the module Automation Engineering.

EA0203 Basics of Practical Finnish: 1.5 op
Sisältö
This theme is a part of the module Automation Engineering.
EA0204 Electronics and digital technology: 6 op

Sisältö
This theme is a part of the module Automation Engineering.

BEEAN15AEA03-1000 Natural Sciences in Automation Engineering: 15 op

Osaamistavoitteet
The student knows the scientific foundations of automation engineering and is able to apply them into practice in technical solutions. He or she is capable of communicating about the use of the natural sciences in automation.

The student knows the technological basic solutions of measurement technology and is capable of applying them to the practices of automation engineering,

is capable of both written and oral communication in a technological working community,
is aware of the basic laws of physics and mathematics that are related to automation engineering.

EA0301 Measurement technology and its practical applications: 7.5 op

Sisältö
This theme is a part of the module Natural Sciences in Automation Engineering.

EA0302 Working English: 1.5 op

Sisältö
This theme is a part of the module Natural Sciences in Automation Engineering.

EA0303 Mathematical basis of automation: 3 op

Sisältö
This theme is a part of the module Natural Sciences in Automation Engineering.

EA0304 Physical Basis of Automation: 3 op

Sisältö
This theme is a part of the module Natural Sciences in Automation Engineering.

BEEAN15AEA04-1000 Natural Sciences in Electrical Engineering: 15 op

Osaamistavoitteet
The student understands the importance of occupational safety and always acts according to safety regulations in the field. He or she knows and is able to apply electrical engineering in practical technical solutions. He or she understands the basic solutions of data communications technology as well as its importance in solutions for technical devices.

The student has understood the importance of general occupational safety,
always acts in a manner required by electrical work safety, and observes legislation in the field in all planning work,
knows and is capable of applying the laws of physics connected with electrical technology,
knows the theoretical basic solutions of electrical engineering, and is capable of applying them to practices of electrical engineering,
is capable of utilising data communications technology for solving practical technical problems.

**EA0401 Occupational safety and safety in electrical work, directives and orders of electrical engineering: 5 op**

**Sisältö**
This theme is a part of the module Natural Sciences in Electrical Engineering.

**EA0402 Theoretical electrical engineering: 4 op**

**Sisältö**
This theme is a part of the module Natural Sciences in Electrical Engineering.

**EA0403 Physics 1: 3 op**

**Sisältö**
This theme is a part of the module Natural Sciences in Electrical Engineering.

**EA0404 Fundamentals of data communications technology: 3 op**

**Sisältö**
This theme is a part of the module Natural Sciences in Electrical Engineering.

**BEEAN15AEA05-1000 Power Engineering: 19.5 op**

**Osaamistavoitteet**
The student knows the mathematical and technological foundation of power engineering. He or she is capable of applying power engineering into practice and communicating the results of his or her work. He or she masters Finnish civil servants’ requirements for the Swedish language.

The student knows the basics of power technology and its technological solutions, and is capable of applying them to practices in the field, knows how to communicate both in writing and orally in the working community of the field about the work he or she has done, knows the mathematical basis of power engineering, can pass the requirements for civil servants’ Swedish.

**EA0501 Power Engineering and its Practical Applications: 7.5 op**

**Osaamistavoitteet**
Power Engineering 15 cr
The student knows the mathematical and technological foundation of power engineering. He or she is capable of applying power engineering into practice and communicating the results of his or her work. He or she masters Finnish civil servants' requirements for the Swedish language.

The student knows the basics of power technology and its technological solutions, and is capable of applying them to practices in the field, knows how to communicate both in writing and orally in the working community of the field about the work he or she has done, knows the mathematical basis of power engineering, can pass the requirements for civil servants' Swedish.

Sisältö
This theme is a part of the module Power Engineering.

EA0502 Practical Finnish: 4.5 op

Sisältö
This theme is a part of the module Power Engineering.

EA0503 Mathematics of Power Engineering: 3 op

Sisältö
This theme is a part of the module Power Engineering.

EA0504 Communications: 1.5 op

Sisältö
This theme is for Finns only. This is a part of the module Power Engineering.

EA0505 Swedish: 3 op

Sisältö
This theme is for Finns only. This is a part of the module Power Engineering.

BEEAN15AEA06-1000 Application Software: 16.5 op

Osaamistavoitteet
The student is able to plan and implement in practice applications related to technology using software. He or she understands the significance of data security and applies it in practice. He or she knows how to communicate information on the applications of software technology. He or she knows, is able to take into consideration, and to communicate on the impact of scientific phenomena in practical planning work.

The student is familiar with the standardised programming languages of programmable logic controller and is able to plan and implement small-scale applications of logic, is able to communicate both in writing and orally in a foreign language in the working community of
the field,
is capable of carrying out programming applications in different kinds of equipment and systems,
knows the significance of information security and takes its impact into consideration in
programming,
knows the theoretical foundations of the most important scientific phenomena, and is capable of
taking their practical impacts in the application of the technology. The student is able to plan and
implement in practice applications related to technology using software. He or she understands the
significance of data security and applies it in practice. He or she knows how to communicate
information on the applications of software technology. He or she knows, is able to take into
consideration, and to communicate on the impact of scientific phenomena in practical planning work.
The student is familiar with the standardised programming languages of programmable logic
controller and is able to plan and implement small-scale applications of logic,
is able to communicate both in writing and orally in a foreign language in the working community of
the field,
is capable of carrying out programming applications in different kinds of equipment and systems,
knows the significance of information security and takes its impact into consideration in
programming,
knows the theoretical foundations of the most important scientific phenomena, and is capable of
taking their practical impacts in the application of the technology.

EA1701 Programmable Logic Controller: 4 op

Osaamistavoitteet
Application Software 15 cr

The student is able to plan and implement in practice applications related to technology using
software. He or she understands the significance of data security and applies it in practice. He or she
knows how to communicate information on the applications of software technology. He or she
knows, is able to take into consideration, and to communicate on the impact of scientific phenomena
in practical planning work.

The student is familiar with the standardised programming languages of programmable logic
controller and is able to plan and implement small-scale applications of logic,
is able to communicate both in writing and orally in a foreign language in the working community of
the field,
is capable of carrying out programming applications in different kinds of equipment and systems,
knows the significance of information security and takes its impact into consideration in
programming,
knows the theoretical foundations of the most important scientific phenomena, and is capable of
taking their practical impacts in the application of the technology. The student is able to plan and
implement in practice applications related to technology using software. He or she understands the
significance of data security and applies it in practice. He or she knows how to communicate
information on the applications of software technology. He or she knows, is able to take into
consideration, and to communicate on the impact of scientific phenomena in practical planning work.
The student is familiar with the standardised programming languages of programmable logic
controller and is able to plan and implement small-scale applications of logic,
is able to communicate both in writing and orally in a foreign language in the working community of
the field,
is capable of carrying out programming applications in different kinds of equipment and systems,
knows the significance of information security and takes its impact into consideration in
programming,
knows the theoretical foundations of the most important scientific phenomena, and is capable of
taking their practical impacts in the application of the technology.

Sisältö
This theme is a part of the module Application Software.

**EA1702 Programming: 4.5 op**

Sisältö
This theme is a part of the module Application Software.

**EA1703 Practical Finnish: 1.5 op**

Sisältö
This theme is a part of the module Application Software.

**EA1706 Communications: 1.5 op**

Sisältö
This is for Finns only. This theme is a part of the module Application Software.

**EA1704 Information Security: 2 op**

Sisältö
This theme is a part of the module Application Software.

**EA1705 Scientific Phenomena: 3 op**

Sisältö
This theme is a part of the module Application Software.

**BEEAN15AEA09-1000 Automation and Electrical Wiring Design: 15 op**

**Osaamistavoitteet**
The student knows how to plan and implement part of the automation of real production processes.

The student knows the most important characteristics of the automation system and knows how to
programme an automation application in practice,
knows how to implement the field planning required by the automation of a production facility,
knows how to carry out the electrical wiring design required by the automation of a production
facility,
knows how to carry out a small-scale automation and electricity planning project in its real
destination, and to communicate both in writing and orally in a working community in the field about
his or her own profession.
EA0901 Automation System: 4 op
Sisältö
This theme is a part of the module Automation and Electrical Wiring Design.

EA0902 Field Design: 4 op
Sisältö
This theme is a part of the module Automation and Electrical Wiring Design.

EA0903 Electricity Planning for a Production Process: 4 op
Sisältö
This theme is a part of the module Automation and Electrical Wiring Design.

EA0904 Practical Design Work in Professional English: 3 op
Sisältö
This theme is a part of the module Automation and Electrical Wiring Design.

BEEAN15AEA10-1000 Applications of Automation Engineering: 15 op

Osaamistavoitteet
The student knows the principles and application targets of safety automation. The student is familiar with household automation and wireless automation engineering. The student knows how to utilise automation engineering in production guidance systems.

The student knows the principles of security automation and knows how to take its requirements into consideration when making practical automation plans, knows how to plan household automation applications, is familiar with the operating principles of the ERP and MES system and knows how to utilise it in practice, knows how to utilise the possibilities of wireless technology in automation applications.

EA1001 Security Automation: 4 op
Sisältö
This theme is a part of the module Applications of Automation Engineering.

EA1002 Home Automation: 4 op
Sisältö
This theme is a part of the module Automation and Electrical Wiring Design.

EA1003 ERP and MES solutions in production: 4 op
Osaamistavoitteet
The student knows and is able to implement control engineering. He or she is familiar with the technology basics of machine automation. He or she is able to plan and implement control application of piece goods industry.

The student is familiar with the basics of control engineering and knows how to tune a control circuit, knows how to plan hydraulic and pneumatic direction, knows the methods of software technology and knows how to utilise software planning tools in plc application planning.

Opetussuunnitelma
Sisältö
This theme is a part of the module Automation and Electrical Wiring Design.

EA1004 Wireless Technology in Automation: 3 op

EA1201 Control Engineering: 5 op

EA1202 Hydraulics and Pneumatic Systems: 4 op

EA1203 Application Development Environment and Practical Applications for PLC Programming: 6 op

BEEAN15AEA14-1000 Work Placement: 30 op

The student is familiar with work from the point of view of his or her professional field and is capable of applying the theory of his or her own field of studies to the practices of working life. The student is familiar with constant work and entrepreneurship that develops him, or herself and the professional field, gets work at the end of his or her studies, and can take on international tasks in the field.

The student knows how to apply the knowledge that he or she has attained into practice,
knows how to develop him, and herself as well as the professional field,
knows how to function in an international working community, taking cultural factors into account,
is capable operating in a an interactive situation flexibly, constructively, and in a goal-oriented
manner,
knows how to communicate as an expert in a structured, understanding and assuring manner.

**EA1401 Automation Engineering Work Placement: 10 op**

Sisältö  
This theme is a part of the module Work Placement.

**EA1402 Automation Engineering Work Placement: 10 op**

Sisältö  
This theme is a part of the module Work Placement.

**EA1403 Automation Engineering Work Placement: 10 op**

Sisältö  
This theme is a part of the module Work Placement.

**BEEAN15APROFILOIVA-1000 PROFILOIVA: 60 op**

**BEEAN15AEA07-1000 Process Automation: 15 op**

**Osaamistavoitteet**

The student knows the functional principles of the most common production processes. He or she
knows the ways of implementing instrumentation, is able to plan the instrumentation of a process
and to communicate process automation in a foreign language.

The student knows the operating principles of the most important unit processes and automation
methods,
knows how to communicate both in writing and orally in a foreign language in a working community
in the field about his or her own profession,
knows the operating principles of field instruments and devices, and bus interfaces and knows how
to plan and implement process instrumentation with them,
knows the mathematical basis of process automation.

**EA0701 Process Technology: 3 op**

**Osaamistavoitteet**

Process Automation 15 cr

The student knows the functional principles of the most common production processes. He or she
knows the ways of implementing instrumentation, is able to plan the instrumentation of a process
and to communicate process automation in a foreign language.
The student knows the operating principles of the most important unit processes and automation methods, knows how to communicate both in writing and orally in a foreign language in a working community in the field about his or her own profession, knows the operating principles of field instruments and devices, and bus interfaces and knows how to plan and implement process instrumentation with them, knows the mathematical basis of process automation.

**Sisältö**
This theme is a part of the module Process Automation.

**EA0702 Professional English: 1.5 op**

Sisältö
This theme is a part of the module Process Automation.

**EA0703 Instrumentation: 3 op**

Sisältö
This theme is a part of the module Process Automation.

**EA0704 Fieldbuses: 4.5 op**

Sisältö
This theme is a part of the module Process Automation.

**EA0705 Process Automation Mathematics: 3 op**

Sisältö
This theme is a part of the module Process Automation.

**BEEAN15AEA08-1000 Embedded Systems: 15 op**

**Osaamistavoitteet**
The student is familiar with the technology of an embedded system, knows how to apply it to technical issues and use the application development environment in practical implementation. The student can document the results of his or her work. The student knows how to apply for a work placement (traineeship).

The student knows the operational principle of an embedded system, a programming language, and is able to implement a small-scale automation application with it, knows the standards of the field and is able to draft the planning documents in accordance with the documentation practices in the field, knows the most important employment opportunities of his or her own field and how to apply for traineeships, knows how to plan and implement practical automation solutions in an application development environment.
**EA0801 Microcontroller: 5 op**

**Osaamistavoitteet**
Embedded Systems 15 cr

The student is familiar with the technology of an embedded system, knows how to apply it to technical issues and use the application development environment in practical implementation. The student can document the results of his or her work. The student knows how to apply for a work placement (traineeship).

The student knows the operational principle of an embedded system, a programming language, and is able to implement a small-scale automation application with it, knows the standards of the field and is able to draft the planning documents in accordance with the documentation practices in the field, knows the most important employment opportunities of his or her own field and how to apply for traineeships, knows how to plan and implement practical automation solutions in an application development environment.

**Sisältö**
This theme is a part of the module Embedded Systems.

**EA0802 CAD and Technical Documentation: 4 op**

**Sisältö**
This theme is a part of the module Embedded Systems.

**EA0803 Career Guidance: 1.5 op**

**Sisältö**
This theme is a part of the module Embedded Systems.

**EA0804 Application Development Environment: 4.5 op**

**Sisältö**
This theme is a part of the module Embedded Systems.

**BEEAN15AEA11-1000 Maintenance: 15 op**

**Osaamistavoitteet**
The student knows the most important areas of industrial maintenance. He or she knows how to draft a maintenance plan and to implement a maintenance application in an actual location.

The student is aware of the significance of maintenance for the economic activities of a production facility, has a command of reliability-centred maintenance, knows how to use and apply the maintenance system in an actual location,
knows how to implement a maintenance application in the company's production process.

EA1101 Maintenance Economics: 4 op

Sisältö
This theme is a part of the module Maintenance.

EA1102 Reliability Centered Maintenance: 4 op

Sisältö
This theme is a part of the module Maintenance.

EA1103 Maintenance Information System: 4 op

Sisältö
This theme is a part of the module Maintenance.

EA1104 Applying Maintenance: 3 op

Sisältö
This theme is a part of the module Maintenance.

BEEAN15AEA13-1000 Production automation: 15 op

Osaamistavoitteet
The student is familiar with the applicability of new automation technologies in production. He or she knows how to apply them to automation of production. The student has the readiness to begin the drafting of his or her own thesis.

The student is familiar with the theoretical basis of robotics and knows how to draw up a real robot application in a development environment, knows the mathematical foundation of machine vision and knows how to implement a real computer vision application, know the mathematical basis of simulation, knows how to utilise simulation and a simulator in the automation planning of production, is ready to start in the drafting of his or her own thesis independently and successfully.

EA1301 Robotics: 4 op

Sisältö
This theme is a part of the module Production Automation.

EA1302 Machine Vision: 4 op

Sisältö
This theme is a part of the module Automation and Control.

**EA1303 Mathematics of Simulation: 3 op**

**Sisältö**
This theme is a part of the module Production Automation.

**EA1304 Simulating Production: 3 op**

**Sisältö**
This theme is a part of the module Production Automation.

**EA1305 Planning and Guidance of a Thesis: 1 op**

**Sisältö**
This theme is a part of the module Production Automation.

**BEEAN15A7777-1000 Opinnäytetyö: 15 op**

**BEEAN15AEA15-1000 Final Thesis: 0 op**

**99991203 Final Thesis: 15 op**